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Release Plan
Content Description
for the ECS Project

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RESPONSIBLE ENGINEER

R. E. Clinard /s/ for   10/17/95

Richard Barbiere, Release Manager
EOSDIS Core System Project

SUBMITTED BY

R. E. Clinard /s/   10/17/95

Robert Clinard, SI&P Manager
EOSDIS Core System Project

Hughes Information Technology Corporation
Upper Marlboro, Maryland

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Preface

This issue of the Release Plan updates the ECS functional capabilities and services that are provided for each Release to be consistent with the ECS design presented at the Release A CDR and the ECS design that will be presented at the FOS CDR and the Release B IDR. Several Release C capabilities have shifted to earlier Releases in this issue of the Release Plan. These capability shifts are as follows:

Subsystem/Capability	Previous Release	Current Release
Data Server	C	B
• Update subscriptions previously submitted		
• Session timeouts	C	C/B
• Session logs	C	C/B
• Compression I/F	C	C/B
• DAR function accessible from the distributed client; user updates to ASTER DARs	C	B
• Delete archive data upon authorized request	C	C/B
• Notify users when a product is eligible for deletion	C	B
• Statistically monitor archive and media characteristics (e.g. BER)	C	C/B/A
• Provide time estimates for data to be distributed	C	B
• Order history across DAACs	C	B
• Allow cancellation, suspension, and restart of distribution requests	C	C/B
Ingest		
• Ingest hard copy by input by scanning and digitizing	C	B
Planning & Data Processing		
• Processing plan generation based on complex strategies	C	(deleted)
• String load balancing	C	C/B
• Automatic replan	C	C/B

	Previous Release	Current Release
• Pre-processing of ancillary data types (via SDP Toolkit)	C	A/B
• DAAC QA enabling software	C	(deleted)
• Complete queuing functionality across strings	C	C/B

CIDM

	Previous Release	Current Release
• On-line tutorial for system access, search, browse and order. Three levels of user interaction support.	C	B
• Simultaneous display of multiple browse products	C	B
• Character user interface for a limited set of functions	C	B
• Character user interface for directory search	C	B
• Character user interface for guide search	C	B
• Character interface for produce ordering	C	B
• Support interactive user order cancellation and user updates to orders	C	C/B
• Character user interface for product processing requests	C	B
• Time estimate of on-demand subsetting and subsampling prior to distribution	C	B
• Interface to conflict adjudication and resolution	C	B
• Geographic name search additions	C	B
• Two-way search and data order interoperability with CIESIN and NOAA	C	B/A
• Spatial temporal coincidence search across DAACs; keyword coincidence within a DAAC	C	B

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1. Introduction

1.1   Purpose

The purpose of this paper is to provide a plan for the delivery of the functional capabilities and services to the operational facilities that are contained in the EOSDIS Core System. This paper includes the functional capabilities and services required to support Change Order #1. This paper was developed by the members of the Release Planning Working Group which consists of representatives from the SIP, SDPS, CSMS, FOS, Project Control, Configuration Management, Quality Assurance and M&O organizations.

1.2   Organization

This paper is organized as follows:

- Section 2 describes the relationship between this document and other ECS planning documents and white papers.

- Section 3 lists related documents.

- Section 4 presents an overview of the Multi-track Development Process.

- Section 5 identifies the external driving requirements/milestones on the ECS Project; including support to mission operations and mission data processing, IV&V testing and EOS ground system interface testing.

- Section 6 lists the ECS functional capabilities and services required to meet the driving requirements/milestones given in Section 5.

- Section 7 identifies the ECS Releases and the missions that are supported by each Release. It also provides a mapping of the driving requirements/milestones to Releases.

- Section 8 updates Table 2.5-2 in the SOW to the Releases identified in Section 7.

- Section 9 provides an overview of the Evaluation Packages (EPs) and lists which EPs are integrated into the ECS Releases.

- Section 10 provides a detailed mapping by ECS Segment of the functional capabilities and services to Releases.

- Section 11 identifies the ECS System Architecture as described in the ECS System Design Specification and maps the architecture to ECS Release.

- Section 12 provides a description of the builds/threads that will be integrated and tested to provide the functional capabilities and services contained in each Release.

- Section 13 presents the schedules for the development of the ECS Releases and it also presents the external ECS driving mission milestones/schedules.

1.3   Review and Approval

This document is an informal document approved at the Office Manager level. It does not require formal Government review or approval; however, it is submitted with the intent that review and comments will be forthcoming.

Questions regarding technical information contained within this paper should be addressed to the following ECS contacts:

- ECS Contacts
    - Richard Barbiere, (301) 925-0678

Questions concerning distribution or control of this document should be addressed to:

Data Management Office
The ECS Project Office
Hughes Information Technology Corporation
1616 McCormick Dr.
Upper Marlboro, MD 20774

2. Overview

2.1   Overview

This section is an overview of the Release Plan and it describes the relationship between it and other planning documents and white papers. This relationship is shown in the figure below.
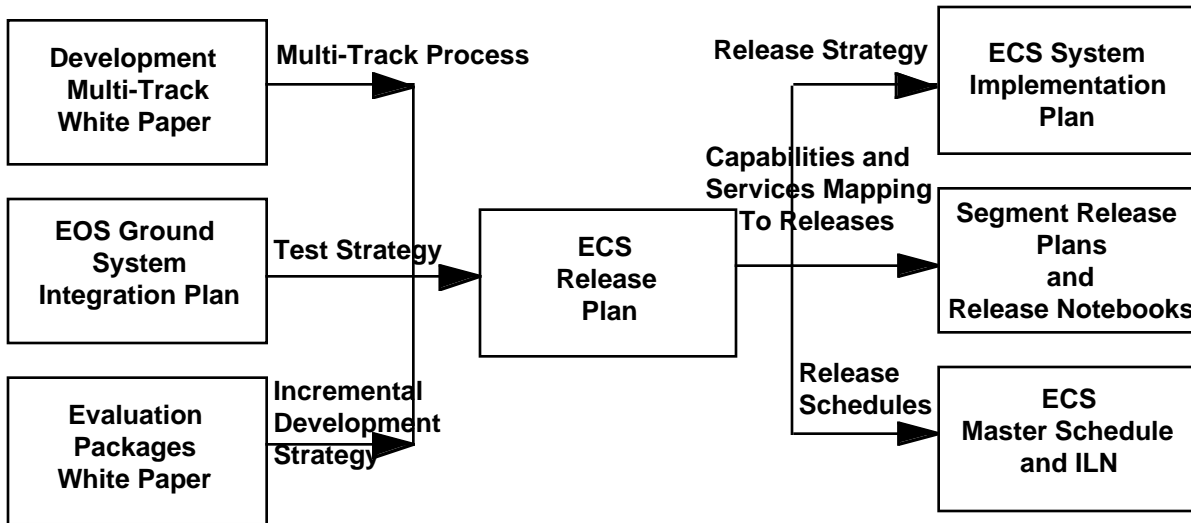
Figure 2.1-1. Release Plan Relationship to Other Planning Documents

Figure 2.1-1 shows that this plan was developed using several other documents as source references. The Multi-track Development Process described in Section 4 was extracted from the ECS Multi-track Development Paper. Section 4 presents a summary of this process, and more detail can be found in the white paper. Many of the external driving requirements/milestones shown in Section 5 were taken from the EOS Ground System Integration Plan. This provided the launch dates for the missions, and the supporting interface and ground system test requirements. The ECS Evaluation Packages Plan white paper was used to map Evaluation Packages to ECS Releases.   This mapping is presented in Section 9 of this plan.

Figure 2.1-1 also shows the documents that will be affected by this Release Plan. The release strategy contained in this plan will be incorporated into the next update of the ECS System Implementation Plan. The detailed mapping of the ECS functional capabilities and services to Releases will be used in the Segment Release Plans and Release Notebooks to show how the ECS will be developed over the lifetime of the project. The Release schedules contained in

Section 13 of this plan will be incorporated into the next update of the ECS Master Schedule and Intermediate Logic Network (ILN). Although not shown in the figure, Section 8 of this plan will be used to update the mapping of ECS functionality to Releases that is given in the ECS SOW.

The data/tables contained in Sections 5, 6, 7 and 10 provide a roadmap from the driving requirements that affect ECS to the capabilities/services delivered for each Release. Section 5 lists the driving requirements/milestones that affect the development of the ECS. These driving requirements are primarily concerned with mission operations support for the EOS spacecraft and related missions, early interface testing of the ECS with ESDIS, TSDIS, SDPF and other interfacing ground systems, science software support for science algorithm development and science software algorithm I&T, the interoperability and transition of the V0 capabilities to V1, and the leapfrog of the V0 capabilities with V1. Section 6 in a tabular format lists the ECS functional capabilities and Segment services that satisfy the driving requirements/milestones that are presented in Section 5. The functional capabilities and services are described in Section 6 similar to how they are described in the ECS System Requirements Specification (DID 216/SE1). The sequence of driving requirements/milestones in the Section 6 tables correspond to the order in which they are discussed in Section 5. This is also true in Section 7 (again in a tabular format) where the driving requirements/milestones are mapped to an ECS Release. Section 10 presents a master table that maps ECS functional capabilities and Segment services to an ECS Release. Table 10-1 presents the Segement services as they are described in the ECS System Design Specification (DID 207/SE1). Most reviewers should use the data contained in the Section 10 tables to describe the ECS functional capabilities and Segment services that are delivered with an ECS Release. The tables in section 11 map the ECS software architecture (represented by subsystems/CIs and service classes) to Releases. This provides a quick overview of the ECS service classes that are delivered for each Release. This data is provided in more detail in Section 10. Again, most reviewers should use the data contained in Section 10 to obtain a more detailed description of the services provided for each Release.

3. Related Documents

3.1 Related Documents

This document was developed using the concepts and processes described in several ECS Papers, ECS CDRLs and EOSDIS Planning Documents. This document will also be used as source material for several ECS CDRLs. Section 2 describes the relationship between this Release Plan and other related documents. The documents that are related to this Release Plan are as follows:

FB9401V2	EOSDIS Core System Science Information Architecture, March 1994
FB9402V2	ECS Science Requirements Summary White Paper, February 1994
FB9404V2	Multi-Track Development for the ECS Project, March 1994
FB9405V2	System Management Service Distribution for the ECS Project, April 1994
193-00623	ECS Evolutionary Development White Paper, December 1993
MA9402V1	ECS Evaluation Packages Strategic Plan, September 1994
GSWIG Briefing	EOSDIS Integration and Certification, June 1994
SES Inc.	EOS Ground System Integration Plan, September 1993
107-CD-001-XXX	Level 1 Master Schedule for the ECS Project, November 1994
108-CD-001-XXX	Intermediate Logic Network Diagrams for the ECS Project, April 1995
194-201-SE1-001	System Engineering Plan for the ECS Project, June 1994
301-CD-002-003	System Implementation Plan for the ECS Project, June 1994
307-CD-001-002 & 329-CD-001-002	Flight Operations Segment (FOS) Release Plan and Development Plan for the ECS Project, Final, March 1995
307-CD-002-002 & 329-CD-002-002	Science Data Processing Segment (SDPS) Release and Development Plan for the ECS Project, Final, March 1995
307-CD-003-002 & 329-CD-003-002	Communications and System Management Segment Release and Development Plan for the ECS Project, Final, March 1995
402-CD-001-002	Segment Integration and Test Plan for the ECS Project, Volume 1: Interim Release 1 (IR-1), Final, February 1995
402-CD-002-002	Segment Integration and Test Plan for the ECS Project, Volume 2: Release A, Final, February 1995
409-CD-001-003	ECS Overall System Acceptance Test Plan for Release A, February 1995

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4. Multi-Track Development Process

This section describes the process for developing ECS capabilities in two tracks: formal track (Releases) and incremental track (Evaluation Packages).Operational software is developed using both the incremental and formal development methodologies. A more detailed discussion of multi-track development is contained in the "ECS Multi-track Development White Paper".

Incremental development is characterized by a sequence of short development cycles (6-9 months each) with each increment building upon the previous one. It is used for areas of the system where it is desired to obtain early user feedback and to minimize the turnaround time required to incorporate this feedback into the system. In order to achieve the short development cycle, this methodology employs a streamlined review, documentation, and test process. Also, a significant portion of each increment is devoted to modifying existing software to incorporate user feedback. Full documentation and formal testing is accomplished on the "as-built" components after it has been determined that the components meet user needs.

Formal development is characterized by longer development cycles (18-24 months) with formal reviews, documentation, and testing. This methodology is used for areas of the system where requirements are well understood.

Our approach is to use incremental development for those areas of the system where requirements are less well understood and formal development where requirements are believed to be more stable. Based on this criteria, candidate areas for incremental development include toolkits and data management services. Candidates for formal development include flight operations, data production services and archive services. However, it should be noted that some candidate components for formal development may need to be developed incrementally in order to provide the necessary infrastructure to support other incrementally developed components. For example, many of the communication services will likely be developed incrementally because they are required to support data management services.

Both formal and incremental development tracks must be implemented in a way that assures compliance with acknowledged requirements, provides traceability of requirements allocation to tracks, a development methodology that allows modular development, an integration process that brings the separately developed pieces back together into an integrated whole, and a process for control of interfaces that supports that integration. Above all, there must be clear visibility into the process at the outset, as it is implemented, and at the end of major phases (releases) when products are formally developed to support real world operations needs.

The premise behind multi-track development for ECS is that these two differing requirement types can be best implemented through differing development processes tailored to their individual needs.

4.1   Multi-Track Concepts

All ECS products which enter operational use are delivered from the Formal Track, and all requirements analysis is done in a common process at the front-end of development cycles. Requirements traceabililty for the whole system is done from one common database which serves both tracks. These features are illustrated in Figure 4-1.1. Development Track Linkage. This is discussed in more detail in the "ECS Multi-track Development White Paper."
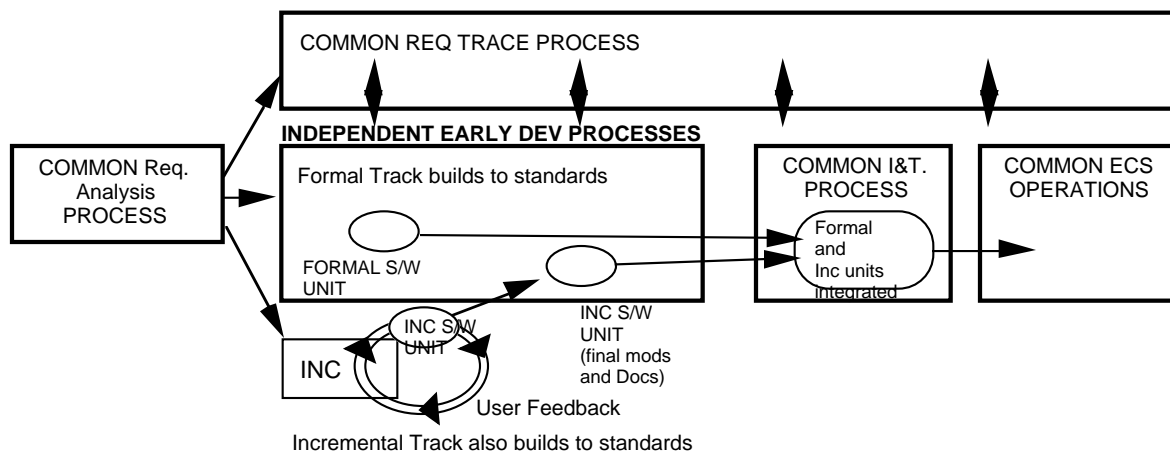
Figure 4.1-1. Development Track Linkage

It becomes obvious from viewing this figure that the multitrack process is not a radical departure from previously proposed methods into widely divergent paths, but merely a specialized implementation of rapid prototyping in an incremental service building process which is tracked with, and remerged with, the Formal Track. The incremental track provides the means for experimentation with alternate implementations of services, evaluation of those implementations by users, and iterative refinement and capability extension until satisfactory products are achieved.

Evaluation Packages (EP) are delivery mechanisms with a predefined date for delivery of individual increments and selected prototypes. The dates are documented in the ECS Master Schedule, and the content of each EP delivery is documented in the ECS Evaluation Package Strategic Planning white paper. These products are delivered in advance of formal releases allowing members of the user community to use the capability for evaluation purposes and to make their members of the user community known as direct feedback to the ECS developers. The feedback from one EP influences the objectives and design for the next. Each EP builds upon and expands the capabilities of previous EPs, until the last Ep in the series supporting a formal release, when the software is migrated to the formal track for integration, acceptance testing, and formal delivery.

Products which have been found acceptable on the Incremental Track flow back to the Formal Track for final update, if required, completion of formal documentation, and integration and test as part of a designated release to system operation. As noted in the figure, both tracks employ identical software standards to assure minimum "throwaway" code on the incremental track and ease of final modification and integration.

4.2   Development Tracks

Two development tracks (formal and incremental) and prototyping activities produce products for deployment. Each has its unique characteristics and purpose, and each is subject to differing levels of visibility, review, and control. The prototyping activity produces no products destined for operational use and is described here only for completeness because it does interface with the other tracks for deployment of selected prototypes as part of EPs.

4.2.1 Formal Development

The formal release track produces products through a rigorous process of requirements analysis, design, development to standards, and thorough testing. Those products which are known to demand very high reliability, and where design requirements are well understood at the beginning of development, are developed on this track. Eventually, all ECS products, including those which are first developed on the incremental track, are fielded through the formal track process.

4.2.2 Incremental Development

The incremental development track produces production quality software on a medium cycle time scale (six to nine months) to provide user evaluation of real, fully functioning products. Cycle time is reduced by greatly reducing the formality of design reviews, and by deferring formal documentation until each product is accepted from the evaluation process, and the product migrates to the formal release track in accordance with previously defined schedules.

Increment personnel do not participate in the major program reviews of the formal track, but they do benefit from that process via the flowdown of information through the system and segment engineering and management personnel who do.

Maximum customer involvement and influence on incrementally developed products is designed into the incremental process. Developer personnel on the incremental track receive participatory customer and user community input and guidance in monthly demonstrations and reviews which communicate objectives, designs, and development progress. They also hold weekly status and planning sessions with customers via teleconferencing. A major communication event occurs at the transition point in the EP development process where development on one EP has just been completed, and objectives for the next EP are being validated. Customer and community scientists and managers convene at the EDF where incremental developers demonstrate the achievements of the completed EP to build understanding, and to lead to agreement on the new EP objectives set in a joint working group.

4.2.3 Prototyping

The prototyping activity produces instances of engineering and technology advances or implementations for review and evaluation by developers and potential users. Visibility and experimentation are paramount; compliance with standards, formal reviews and heavy documentation is minimal. Cycle time is very short to allow fast evaluation and experimentation with a subsequent version. Products from the prototyping activity have no longevity after their experimental purpose is achieved. Prototyping products flow to the User Evaluation arena either as standalone prototypes or as part of an Evaluation Package (EP). Those which are destined for more formal evaluation are deployed in an EP which offers a broader set of evaluators, more realistic operational environment, and a formal evaluation results gathering and analysis process. The results from prototyping feed back to later prototypes, to the incremental track, and to the formal track products.

4.3   Integration And Test Of Multiple Track Products

The Integration and Test function is crucial to the success of the multi-track development process. There are three types of I&T in the multi-track process in addition to Acceptance Test (AT) process. The first type of I&T is in support of the deployment of an increment and selected prototypes as part of an evaluation package. This IT&T is conducted by a combination team of Segment and System I&T organizations and supports the EPERR. The second type of I&T is the integration of incrementally developed components with formally developed components. This second type of I&T is performed by the Segments and is performed after the TRR for the formal track as part of their Segment I&T activity. The third type of I&T is that performed by System I&T after the Segments conduct an ETR. This third I&T combines the results of multiple segments and concludes with CSR. IATO then conducts acceptance tests to the Level 3 requirements assigned to that release. A more detailed description of the three types of I&T is presented in Section 7 of the Multi-Track Development White Paper (FB9404V2).

5. External Driving Requirements/Milestones

This section describes the external ECS requirements/milestones that drive the release of ECS functional capabilities. This section includes requirements to support mission operations and mission data processing, and it includes requirements to support IV&V testing and operational EOS ground system interface testing.

5.1   TRMM Support

TRMM (Tropical Rainfall Measurement Mission) is a platform scheduled for launch in August 1997 which relies on ECS to support its mission. As shown in Figure 5.1-1, the Level 0 data from the three TRMM instruments (PR, TMI, and VIRS) will be higher level processed by TSDIS, a production system provided by the TRMM project. ECS will provide the data archive for this data; PR and TMI data will be archived at the MSFC DAAC and VIRS at the GSFC DAAC. Additionally, ECS will provide the production facilities for Level 1 and higher level processing for two EOS instruments of opportunity on TRMM, CERES and LIS, at the LaRC and MSFC DAACs respectively. ECS will provide the data archive for these data as well. ECS also will provide data search, order and distribution services to science users for information derived from all 5 instruments stored in the archives. The interfaces shown in the figure must be operational in time to support early integration and test of the TRMM Ground System. Additionally, user data search, order and distribution services on TRMM data must available at launch.

5.1.1   TRMM Early Interface Testing Support

Driven by the launch date but prior to it, some ECS capabilities must be available for early interface testing. Recommended TRMM interfaces for these tests are marked with an asterisk in Figure 5.1-1. Per the EOS Ground System Integration Plan, the ECS functions to support early interface testing of these TRMM interfaces must be available by 1/3/96.

5.2   Landsat-7 Support

Due to a restructuring of the Landsat-7 program baseline, the Landsat-7 operations concept has changed. Landsat-7 will have a global refresh approach to scene acquistion and X-band will be used to transmit collected data to the ground. Data Acquisition Requests will no longer be used for Landsat-7. In addition, ECS will become the archive for Landsat-7 data. This data will not be processed to higher levels by either Landsat-7 or ECS. This document reflects the current concept for Landsat-7. The operation concept for Landsat-7 is evolving and will be updated with the next issue of this document.
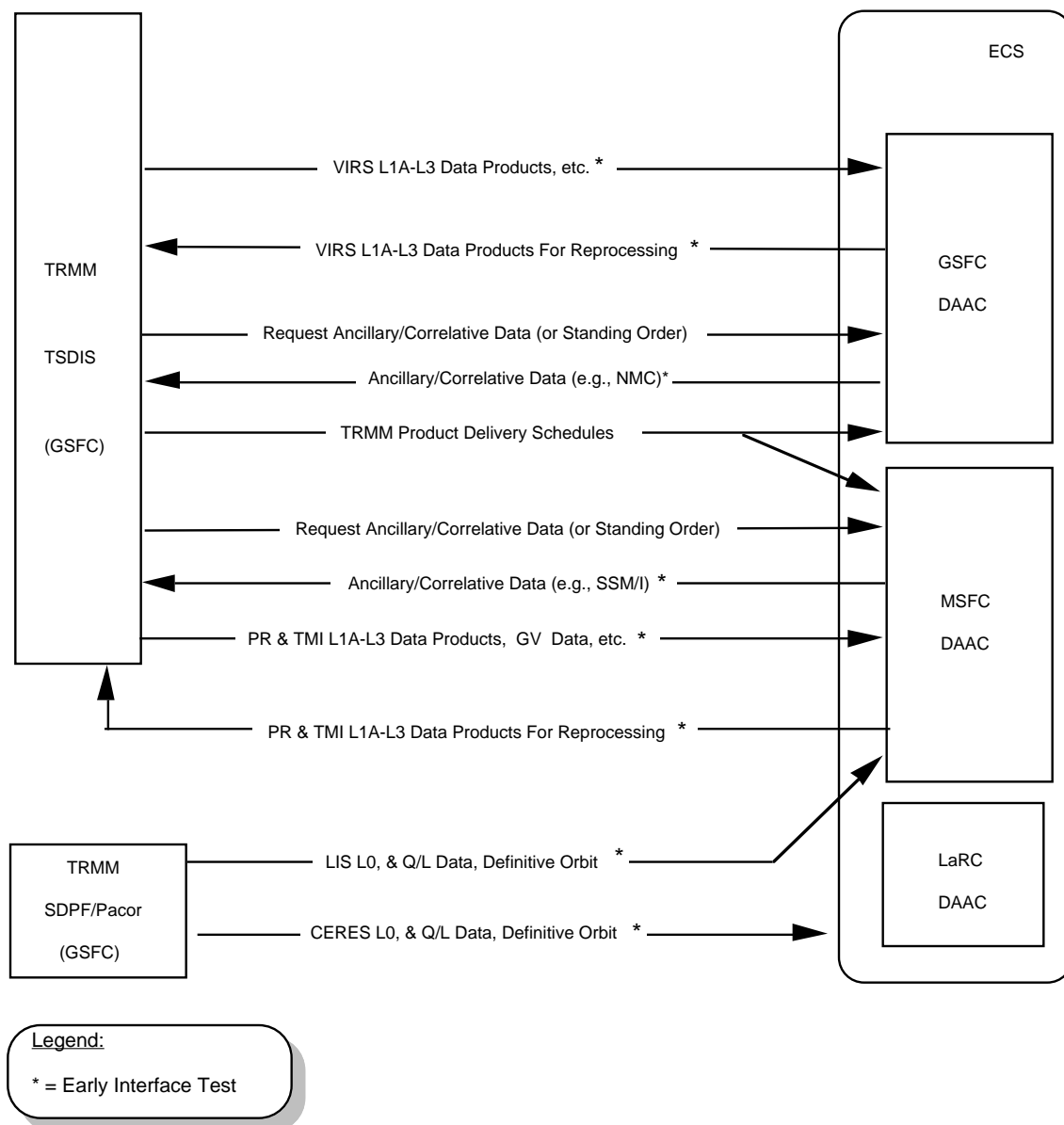
Figure 5.1-1. ECS TRMM Interfaces

Landsat-7 is currently scheduled for May 1998 launch and also relies on ECS for support. Landsat-7 produces Level 0R data, which is a viewable image product with radiometric and geometric information appended, but not applied. Landsat-7 provides ECS metadata and browse data corresponding to its Level 0R products. As shown in Figure 5.2-1, ECS provides the data search, order and distribution services to users of Landsat-7 data. Landsat-7 International Ground Stations (IGSs) will also provde metadata and browse to ECS, however ECS will not provide the product order service to users for IGS unique products. The interfaces shown in Figure 5.2-1 must be operational in time to support the Landsat-7 launch. These interfaces must be available to support LANDSAT 7 Ground System Certification Testing. Additionally, user data search, order and distribution services on Landsat-7 data must be available by launch.

5.2.1 Landsat-7 Early Interface Testing Support

As with TRMM, some ECS capabilities must be available for early Landsat-7 interface testing. Recommended Landsat-7 interfaces for these tests are marked with an asterisk in Figure 5.2-1. Per the EOS Ground System Integration Plan, the ECS functions to support early interface testing of these Landsat-7 interfaces must be available by 1/3/97.

5.3 Color Support

The Color platform is scheduled for launch in October 1998. ECS support for Color is not currently in the ECS baseline, but is assumed to be similar to the V0 DAAC support for SeaWiFS. Under this assumption, an ECS DAAC (GSFC) will be responsible for receiving higher level (level 1A and above) color instrument data from a Color production facility. Presumably this would include associated metadata and browse. The DAAC would be responsible for archiving the data and providing data search, order and distribution services to authorized Color users. In SeaWiFS, the Version 0 DAAC also provides regular user access and distribution reports back to the production facility. This interface may also be required for Color. These interfaces must be operational in time to support the Color launch. Additionally, user data search, order and distribution services on Color data must available by launch.

5.3.1 Color Early Interface Testing Support

Some ECS capabilities must be available for early Color interface testing. Recommended Color interfaces for these tests are to be determined. Per the EOS Ground System Integration Plan, the ECS functions to support early interface testing of key ECS-Color interfaces must be available by 2/1/97.

5.4 EOS AM-1 Support

AM-1 is scheduled for launch in June 1998. Figures 5.4-1 and 5.4-2 summarize the external interfaces required to support the AM-1 launch for the FOS and SDPS/CSMS segments respectively. The full set of ECS functionality must be operational to support AM-1 launch. This includes FOS planning, scheduling, command, control and monitoring of the AM-1 spacecraft; SDPS data ingest, production, archive, query and distribution; and CSMS system management and communications infrastructure.

Figure 5.2-1 ECS Landsat-7 Interfaces
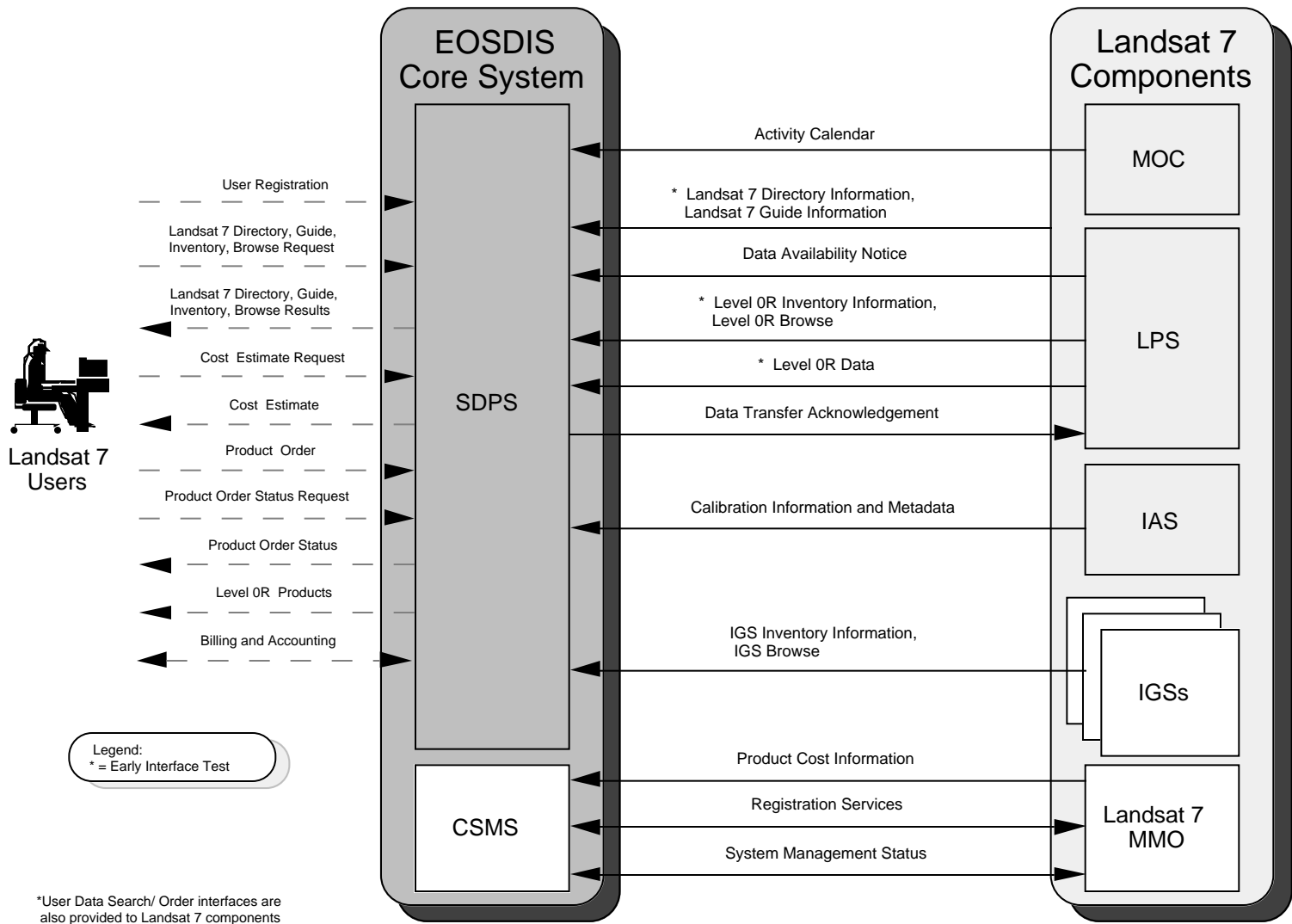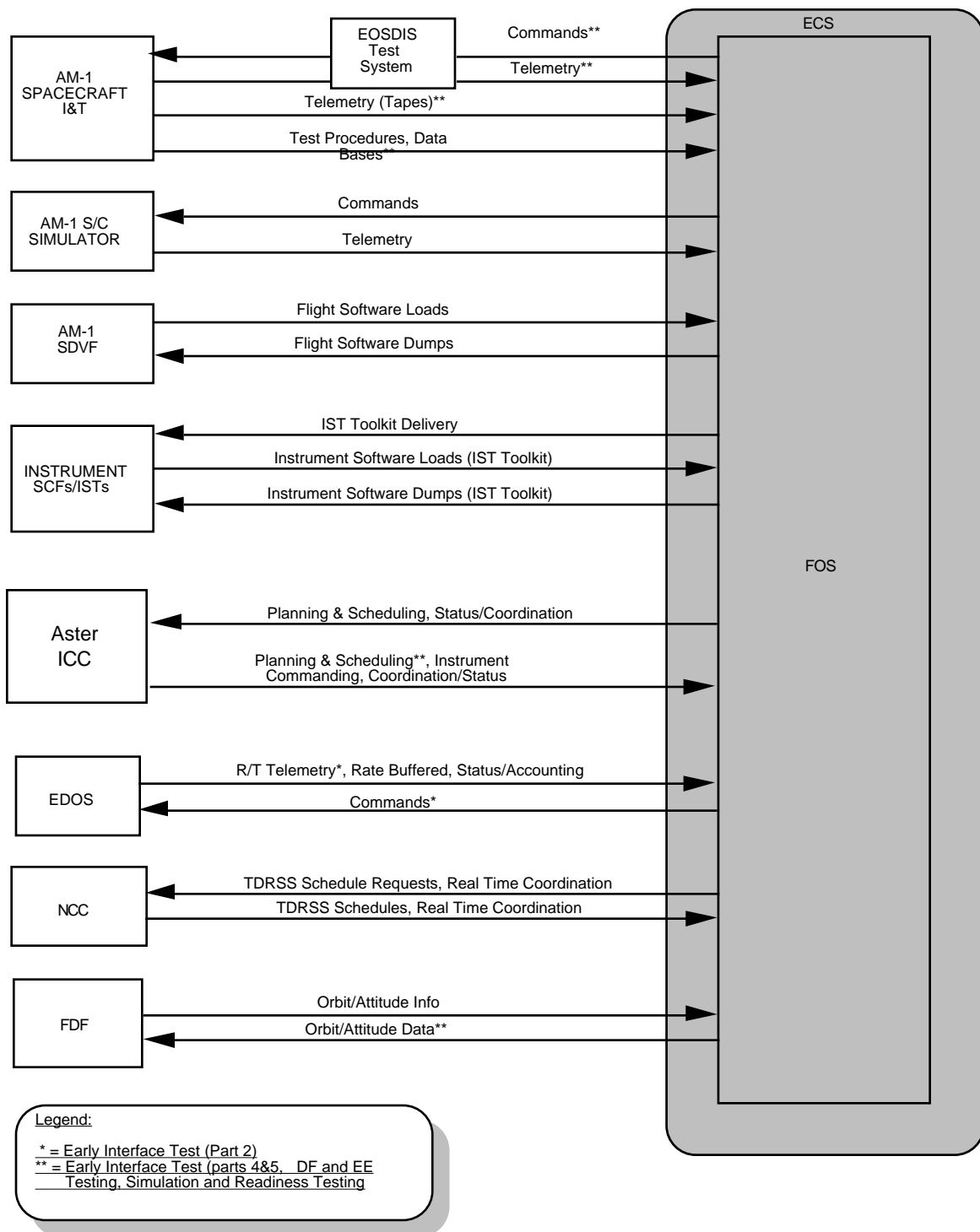
Figure 5.4-1 FOS AM-1 Interfaces
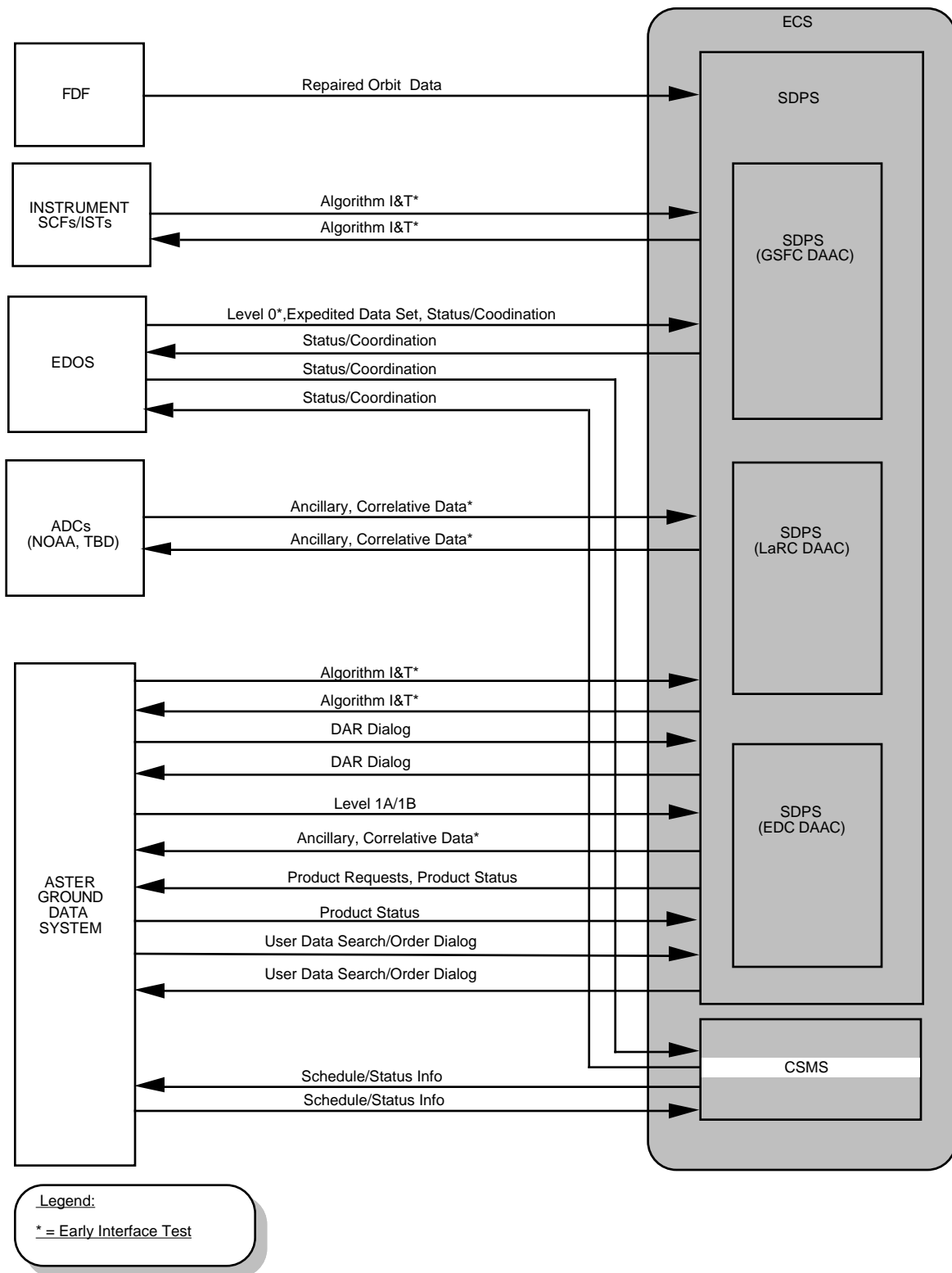
Figure 5.4-2. SDPS/CSMS AM-1 Interfaces

5.4.1 EOS Early AM-1 Test Support

The Flight Operations Segment (FOS) will support early interface testing with the spacecraft, instruments, EDOS, and ECOM. These tests are directed by the spacecraft contractor and include spacecraft and spacecraft bus compatibility tests, spacecraft comprehensive tests, spacecraft pre-ship and post-ship tests, mission operations simulations and spacecraft performance tests.

In addition, the FOS Segment will support early ground data interface testing with NASA institutional support (FDF, NCC, WTS, etc.) as part of the ESDIS ground systems integration effort.

5.4.1.1 AM-1 Data Flow & End-to-End Test Support

The early AM-1 spacecraft tests begin at launch - 19 months, which coincides with the delivery of ECS Release A. FOS functionality needed for the spacecraft and spacecraft bus performance tests, EOC and spacecraft compatibility tests will be included in Release A. Other spacecraft tests occur after Release B when full FOS AM-1 support functionality will exist.

The FOS will provide test support for the scheduled spacecraft suite of tests including the following:

- **EOC Compatibility Tests**: (L-19 to L-6) Real-time data and SCC dump data transmitted from East Windsor to EOC through ECOM and EDOS simulator. Also canned instrument science data provided to the local IGSE, commanding provided to the spacecraft from the EOC via ECOM is also planned.

- **Spacecraft End-to-End Test**: (L-3) All data formats transmitted to the EOC and EOSDIS through the CTV, TDRSS, EDOS, and ECOM. Spacecraft commands transmitted to the spacecraft from the EOC through ECOM with command verification functionality verified.

- **Spacecraft Comprehensive Performance Test**: (Post Ship: L-7 weeks) Real-time data and SCC dump data transmitted to the EOC through ECOM/EDOS simulator. Also SSR housekeeping buffer dumps transmitted to the EOC via tape. Spacecraft commanding via ECOM data link.

5.4.1.2 Ground Data System (KIIT & Certification) Test Support

The suite of Ground Data System Tests are designed to verify critical functionality of the ECS ground data system and related external interface interdependency (i.e. command management utilizing FDF and NCC provided data, telemetry processing from data provided by the ETS through the EDOS/ECOM link).   Each test may include any of the following FOS internal and/or external components: EOC, ICC, DIF, DPF, DAACs, DSN, WOTS, GN, TDRSS, FDF, NCC and the ETS at various sites.

Major FOS functions planned for verification by the Ground Data System group of tests include mission planning, mission scheduling, telemetry processing, command transmission and verification, OBC data processing, FDF and NCC data processing and transmission.

Testing to support the ground data system begins at L - 16 months, three months following the ECS Release A delivery ; FDF and NCC interface full-up functionality is planned for Release B.

5.4.1.3 Mission Simulation Support

- **Mission Simulation Readiness Tests:**(L-12) Simulation readiness tests verify functional capabilities of simulators and individual elements, interfaces, and communication paths when configured for integrated simulations.

- **Mission Operations Simulation:** (L-6) Real-time data and SCC dump data transmitted to the EOC through ECOM/EDOS simulator. Also SSR housekeeping buffer dumps transmitted to the EOC via tape. Spacecraft commanding will be performed via the EDOS simulator/ECOM data link.

5.5   AERO Support (provide with Change Order #2)

5.6   EOS PM-1 Support (provide with Change Order #3)

5.7   ALT Support (provide with Change Order #2)

5.8   CHEM Support (provide with Change Order #4)

5.9   Independent Verification and Validation (IV&V) Support

Prior to the Release Readiness Review (RRR), the IV&V contractor can witness and/or monitor release acceptance testing and document nonconformances. Upon successful completion of the RRR, the IV&V contractor verifies that the ECS release operates correctly within the EOS Ground System (EGS). The ECS contractor, specifically the Independent Acceptance Test Organization (IATO), supports the IV&V contractor in this effort for a period of one month following RRR at the operational sites. The IATO coordinates personnel, facilities, and equipment support in the resolution of ECS nonconformances identified during IV&V testing. ECS contractor Maintenance and Operations personnel also support IV&V activities at operational centers, as necessary.

5.10 V0/ADC Interoperability

Two-way interoperability involves two different capabilities. First, outgoing interoperability allows users to log into the ECS and access ECS services, including the ability to access non-ECS data products from a site external to ECS directly from the ECS user interface. Second, incoming interoperability allows users, who are logged into a non-ECS site, to access ECS data products directly from the non-ECS user interface, using non-ECS IMS services.

 NASA has agreed that interoperability is not reasonable until ECS-unique data holdings are available. That would not occur until ECS integrates with TRMM and other platforms (Release A). Two-way Version 0 interoperability prior to the transition from Version 0 to Version 1 ECS is required to ease the transition process. One-way interoperability with ADCs (ECS to ADCs)

is also required early to ease the Version 0 transition. Two-way interoperability with ADCs is a mission fulfilment capability since it is not required for TRMM or EOS AM-1 misson support.

5.11 Science Software Support

The first set of driving dates define hardware installation dependencies. The ECS project recommends that the required PGS hardware strings be made available several months prior to Version 1 delivery of the algorithms to allow independent SCF I&T before formal AIT. The following hardware installations are required to support that availability requirement:

- I&T hardware at GSFC to support MODIS Version 1 I&T

- I&T hardware at LaRC to support TRMM-CERES Version 1 I&T

- I&T hardware at LaRC to support MISR and MOPITT Version 1 I&T

- I&T hardware at MSFC to support TRMM-LIS Version 1 I&T

- I&T hardware at EDC to support ASTER Version 1 I&T

Similarly, if new hardware is required for Version 2 algorithms, the hardware installations for a site must be in place several months in advance of an algorithm's Version 2 integration at that site.

In addition, to support full end-to-end testing of the algorithms, ECS infrastructure software (ancillary/auxiliary data ingest and preparation, DAAC-to-DAAC data transfers, Level 0 data validation, algorithm delivery, and algorithm product QA services) must be in place at the end of the Version 2 I&T for each instrument. Version 2 I&T for EOS AM-1 instruments MODIS (GSFC), MISR (LaRC), MOPITT (LaRC), and ASTER (EDC) is scheduled for mid-1997. The tested Version 2 algorithms will be integrated with other ECS components at that time.

PGS toolkit deliveries must be made twelve months prior to the Beta reviews for each AM-1 algorithm and twelve months prior to Version 1 delivery for TRMM algorithms:

- TRMM-CERES and TRMM-LIS Version 1 delivery --end of 1995

- ASTER, MODIS, CERES, MISR, MOPITT Beta reviews --end of 1995

Therefore, major capabilities (e.g. file I/O software, error-handling software, etc.) must be in place to support TRMM and AM-1 by the end of 1994.

5.12 Building from Version 0

Building on Version 0 for a release implies that the release will be capable of matching (in general) the functionality of Version 0 plus adding some features that Version 0 does not have (i.e. "building on to" (or enhancing) existing Version 0 capabilities). This does not mean the release will match every individual function/capability of Version 0. It will be possible (through interoperability) to access some Version 0 functions, without having to make them part of ECS.

5.12.1   Incorporation of V0 Components in Release A

In some cases, Version 0 functions (software, hardware, design, processes and procedures) will be reused in ECS. The exact candidate components are be described in CDRL 206, Version 0 Analysis Report, May 1994. There are still significant questions about the timing and type of integration (enveloped, shared, interface, reuse) of Version 0 components. These questions will not be answered until the PDR time frame.

At the Release A SDPS PDR, the V0 IMS Client was identified by ECS as a V0 capability that was going to be reused in Release A. The ECS V1 Client will be implemented in Release B, and will completely replace the V0 Client implemented in Release A.

5.12.2   ECS Functionality Needed to Build on Version 0

In order to build on Version 0, it is critical to have a good understanding of what Version 0 functions/capabilities will be in July of 1994 when it is expected that Version 0 will go into general operations. That understanding has been derived from the Version 0 analysis task that is currently in progress. That task is being performed by a team of ECS engineers, with close cooperation from the ECS DAAC liaison staff and the active participation of each Version 0 DAAC.

The following table lists, at a high level, the functions/capabilities that ECS will be providing for SDPS and CSMS and describes corresponding functions/capabilities in Version 0. The table is extracted from the Version 0 Functional Analysis Matrix contained in the Draft Version Zero Analysis Report (CDRL 206/SE2). The emphasis is placed mostly in the SDPS, since this is the most visible and critical to the user community. However,   the infrastructure to support the user community must be in place prior to implementation of these functions. In Release B, ECS will deploy an infrastructure that exceeds that in V0, and which will provide the foundation from which to add future enhancements which exceed V0. A more detailed listing of these functions/capabilities is contained in Section 10 of this document.

Table 5.12.2-1. ECS Functions/Capabilities for SDPS & CSMS (1 of 3)

ECS Function/Capability	Corresponding V0 Function/Capability	Comment
SDPS		
System Access & User Registration	- Guest accounts for public use - Registration for restricted data and data order	
Algorithm Integration & Test	- Most DAACs produce products; integrate algorithms	
SDPS Scheduler	- Mostly manual process	
Information Search	- Directory - Inventory (some data set specific parameters) - Guide - Browse - Bibliography - Various forms of coverage maps - ADC/ODC interoperability with NOAA	
Archival Product Requests	- Standing orders - Electronic and hard media shipments - Order history - Distribution authentication	
Processing Request Services	- Use of ancillary data sets - Standing and on-demand processing - Product QA - Some automated metadata generation	
Manage Storage System Service	- Resource conflict notification - Accounting information generated - Collection of operating statistics	
Toolkit Services	- Data visualization tools - PGS like toolkit (EDC only)	
Communication Services	- Local bulletin boards - User feedback	
Distribution Service	- Hard media and electronic (ftp) - Read software	
Application Program Interface (API) Services	There are no API services in Version 0	

Table 5.12.2-1. ECS Functions/Capabilities for SDPS & CSMS (2 of 3)

SDPS		
Statistical Collection for LSM	- Some user access patterns	
Ingest Service	- Ingest on various media - Conversion to HDF - Creation of metadata - Manual and automated procedures	
Archive Service	- Media management - Integrated FSMSs - Backup copies	
CSMS		
Communications Network Infrastructure	V0 provides significant network infrastructure, including routers, gateways, T1 links and FDDI LAN at the GSFC DAAC. Network management provided by NOC at GSFC using DEC MSU and X-window terminal. Communication Services include FTP, Bulletin Board, e-mail, X.500 Directory Service. V0 support TCP/IP protocol suites.	
Local Site Network Management	Version 0 system does not provide any significant local system network management functions. EDC does have LSM capabilities: SNMP for fault management, DORRAN for acct/accountability management, security management , performance management. Many of these capabilities were not developed for V0 but are used by the EDC DAAC.	
Non-Local System Network Management	V0 System does cross site monitoring of system performance for Performance Management, provides X.500 directory service.	
Internal/External Interfaces	Several DAACs have interfaces to SCF's, LaRC has an interface to NOAA/NESDIS, GSFC to NASDA.	

Table 5.12.2-1. ECS Functions/Capabilities for SDPS & CSMS (3 of 3)

HMI		
Accessibility	Significant effort went into developing the V0 HMI to be accessible, provide user interaction, user friendly features, level of user ability, use of colors/fonts, system feedback, expert shortcuts, and hierarchical data access.	Very limited error prevention/correction functions
Miscellaneous		
Other Data Distribution Types	CD-ROM	
Data Dictionary	Several DAAC's have data dictionaries. JPL is implementing tools for supporting dictionary access and interchange.	
Major Data Sets Visible via V0 System or DAAC IMS/Format	See the Version Zero Analysis Report (CDRL 206) for a listing of data sets.	
Tutorials and Help	EDC and GSFC provide on-line tutorials and help	
Operating System - UNIX Major platforms/element	All DAAC's run on UNIX platforms. See Version 0 Analysis Report Functional Analysis Matrix for a complete list of platforms.	

5.13 Leapfrogging Version 0

Section 5.12 of this document provided an overview of the level functionality provided in Version 0. This section presents areas where the ECS provides functionality above and beyond that which will be available to the user community in V0.   These capabilities are based on experience with the user community and the Version 0 DAACs as to what improvements on V0 capabilities are important.

5.13.1   Science & Data Processing Segment

The SDPS is the most visible portion of the system to the user (science) community, therefore, most of driving requirements behind capabilities beyond V0 are in this area of the SDPS. The table below lists the SDPS capabilities/services that support specific "V0 Leapfrog" driving requirements.

Table 5.13.1-1. Driving Requirement/Functional Capability

Driving Requirement/Milestone	Segment Functional Capability/Service
Information Search	*Inventory Search*: Cross DAAC coincident search, Complex queries
Display of Results	Displaying of a timeline of results
Data Set Specific Search Parameters	Search on attributes across DAACs & data sets
Data Set Specific Results	Results from searches across DAACs & data sets,
Browse	Simultaneous display of multiple browse data, Browse animation
Processing Request Services	Multiple DAAC orders
Archival Product Requests	*Distribution Authentication:* Automated authentication for data distribution
Order History	Order history across DAAC's
Toolkit Services	*Data Visualization:* Data visualization capabilities
IMS Toolkit	API for update, query and DBA utilities
Communication Services	*User Feedback:* On-line user survey containing user feedback from all sites
Manage Storage System Service	Manage storage system resource utilization, Generate accounting inf. for data distribution

5.13.2   Data Availability for Release A

Ingest of TRMM data products and ancillary data into the ECS archive is one area where ECS provides a capability not available to Version 0. Other high priority data sets were defined at the Release A PDR. Section 13.5 lists candidate data sets for V0 transition during Release A.

5.14 DAAC Site Activation

The ECS contract will provide support to eight Distributed Active Archive Centers (DAACs). The DAACs are tasked with generating EOS standard data products and carrying out NASA's responsibilities for data archive, distribution and information management. The DAACs serve as the primary user interface to EOSDIS.   These DAACs are located at: Goddard Space Flight Center (GSFC) Greenbelt, MD; Langley Research Center (LaRC) Hampton, VA; Oak Ridge National Laboratory (ORNL) Oak Ridge, TN; Marshall Space Flight Center (MSFC) Huntsville, AL; EROS Data Center (EDC) Sioux Falls, SD; National Snow and Ice Data Center (NSIDC) Boulder, CO; Jet Propulsion Laboratory (JPL) Pasadena, CA; and the Alaska Synthetic Aperature Radar Facility.

ECS site activation support is based on the following factors: site coordination visits; hardware and software procurement; facility access and beneficial occupancy dates (BODs); Government furnished equipment (GFE) communications installation; hardware and software installation; integration and testing; and ECS staffing and training.

It is important to recognize the needs of maintenance and operations when planning all releases. The dynamics of the multi-track environment could cause major perturbations at the sites, including the DAACs, and FOS and SMC host organizations. Facility, operations, maintenance,

and management considerations will have to be addressed. For example, Release A will provide operational capabilities that are critical to the TRMM mission. Positive control of Release A (and subsequent evaluation package and release contents) will be necessary to ensure operational integrity.

ECS objectives for site activation are as follows:

1) Minimize impact on existing site operations,

2) Provide adequate tools to operate, administer and manage the ECS resources,

3) Provide site staffing that is compatible with site operations requirements, and

4) Provide adequete lead time for the procurement and installation of COTS products

These objectives are discussed in the following sections.

5.14.1   Impact on DAAC Operations

The EOSDIS DAACs have the mission of processing, archiving and distributing earth science data. ECS provides many of the tools to accomplish this mission, but does not provide the only tools. For example, the EROS Data Center already distributes LANDSAT data using an existing data system. Similarly, the Jet Propulsion Lab DAAC distributes SSM/I and other data sets.

The ECS contractor will schedule a series of site coordination trips to all DAACs. The objective of these trips is to ensure that the ECS contractor and the DAAC managers are in agreement with all operational issues. When ECS starts to deliver its systems to the sites, ECS works with the host organizations to ensure that hardware and software installation and segment and system testing all occur in a pre-planned manner that is sensitive to the mission of the host organization. Coordination topics include facility requirements, locations of ECS equipment and personnel, installation and test periods, etc.

5.14.2   ECS Tools for Operations, System Administration and Management

As responsibility for Release A transitions from the development to maintenance and operations (M&O) , the needs of the M&O personnel to operate, administer and manage the system must be considered. On-line performance monitoring tools are necessary to ensure that the product generation, archival and distribution functions are meeting the requirements. Similarly, performance data collection, analysis and reporting tools are necessary so that the ECS contractor and DAAC managers have visibility into ECS performance.

5.14.3   Staffing Issues

Staffing is a major factor in site activation and operations. This staffing includes host organization and ECS personnel. Requirements for personnel and training to operate, administer and manage the ECS are factored into the ECS release plan.

Staffing at each site by the ECS contractor will gradually build up from 1996 on. A Release that demands excessive manual actions to monitor and control performance, or to collect, analyze and report critical performance parameters will make management, administration, and operations

very difficult and not provide a firm foundation for the eventual system. It also risks cost increases by requiring that higher qualified individuals (e.g., senior versus junior technicians) be hired.

Issues of when training and to whom training is provided on ECS products are critical because of the potential impact on ECS operations and user support. Training on COTS hardware and software, and application software, regardless of the development track, is an absolute necessity. If the site's user services are unable to handle issues about an ECS product, additional demands on developers' time will be made to isolate, remedy, or suggest work-arounds to the issues.

5.14.4 COTS Procurement and Installation

Procurement of ECS hardware and software to be installed at ECS sites involves two cycles. Normal COTS procurement cycles are 3.5 to 4 months, while long lead-time procurements vary from 4.5 months to 8.5 months. COTS procurement cycles include requirements analysis, RFP preparation and release, product evaluation and selection, sub-contracting with winning vendor(s), purchase order approval by NASA, release of the purchase order to the vendor, and delivery to the site.

The facility access dates must be at least 2 months prior to the scheduled initial installation date to provide time for site verification inspection, completion Government facility preparations, and receiving of COTS HW and SW. Installations of HW and SW take between 2 and 6 weeks depending on whether the site is an initial installation (requiring LAN installation) and the quantity and complexity of the configurations to be installed.

After installation, staffing and training of the maintenance and operations staff is accomplished. M&O training occurs in conjunction with the 3-month system integration and acceptance testing.

5.15 ADEOS II Support

The second National Space Development Agency (NASDA) Japanese Advanced Earth Observing Satellite (ADEOS II), scheduled for launch in February 1999, will carry the SeaWinds research instrument. The SeaWinds instrument is a spaceborne scatterometer designed to make all-weather measurements of near-surface wind velocity over the world oceans. ECS will provide the science data processing and data archive and distribution functions of the SeaWinds Ground Data System at the JPL DAAC. This includes ECS interfaces with the SeaWinds JPL SCF to support SeaWinds science data processing algorithm development and integration as well as SeaWinds science data QA. ECS will additionally interface with the Japanese ADEOS Ground System for the ingest of Level 0 and ancillary data. Due to its February 1999 launch schedule, ECS ADEOS II support capabilities are planned for ECS Release B. Still in the planning stages, no schedules for early interface testing have yet been established.

6. ECS Functionality Requirements

This section describes the ECS functional capabilities and services required to meet the driving requirements/milestones described in the previous section. This section includes:

- Functionality/services required to support mission operations for TRMM, LANDSAT 7, COLOR, ADEOS II and EOS AM-1. This includes planning and scheduling, command and control, production data processing, data distribution and other ECS functions.

- Functionality/services required to support EOS ground system interface testing. This includes communication services for ESN, network management services and other ECS services.

- Functionality/services required for V0 Interoperability and V0 Leapfrog.

- Functionality/services required for Science Software I&T Support.

6.1 SDPS Functional Capabilities and Services

The table below lists the SDPS functional capabilities and services that are required to meet the driving requirements/milestones in Section 5. The segment services are classified as Mission Critical (MC), Mission Essential (ME) and Mission Fulfilment (MF). The definitions of these classifications is given in the Multi- Track Development White Paper (FB9404V2) and are repeated for completness below:

- <u>Mission Critical Requirements:</u> Define functions necessary to protect ECS critical assets, e.g., the EOS platforms and instruments and the lowest level, irreplaceable data. Functions assure no loss of data and the capability to generate higher level data products.

- <u>Mission Essential Requirements:</u> Provide basic services for long term data storage, data management necessary to serve the user community and the majority of earth science researcher service needs and data distribution needs.

- <u>Mission Fulfillment Requirements.</u> Advanced services targeted at increasing the earth science user's productivity. These include services to meet larger programmatic goals; provide intermediary support of educational policy, and social services communities; and provide services for access to GCDIS and User DIS.

Table 6.1-1. SDPS Driver/Capability/Services Mapping (1 of 13)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
TRMM Support - Early Interface Testing	SDPF/ECS(LaRC) data transfer SDPF/ECS(MSFC) data transfer TSDIS/ECS(MSFC) data transfer TSDIS/ECS(GSFC) data transfer Basic ingest services at 3 sites (GSFC, MSFC, and LaRC) TRMM CERES and LIS Level 0 ingest TRMM data product ingest SCF/ECS data transfer (algorithms, algorithm support data)	<u>Ingest Service (no archiving)</u> - Basic electronic ingest - Receive TRMM L1 and CERES and LIS L0 data - Request retransmission of missing data - Receive HDF and native formats - Transmission (data size) checking	MC
TRMM Support - Mission Support/ Ground System Testing	Same as above plus: TRMM CERES/LIS data processing TRMM CERES & LIS data (L0) ingest and archive services at 2 sites (LaRC and MSFC). TRMM data access On-line archive of TBD TB (aggregate) TRMM data (L1-L4, including GV, ancillary, etc.) ingest and archive services at 2 sites (GSFC and MSFC) Basic SDPS scheduling services	Same as above plus: <u>Ingest Service</u> - Receive TRMM metadata, L1-L4 data products, including GV, schedules, status, etc. - Full TRMM Data Checking - Basic electronic and media ingest (media types TBD) <u>Archive Service</u> - Import and export physical media - Integrated FSMS to manage archive	MC MC

Table 6.1-1. SDPS Driver/Capability/Services Mapping (2 of 13)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
	Ancillary data ingest, reformatting, and regridding for TRMM Full PGS toolkit support TRMM data processing Algorithm Integration Support Algorithm Execution/Test Support TRMM standing orders for distribution and processing	- Three days worth of TRMM data archived in one day - Restore archive - Verify data is present and accounted for - Retrieve TRMM data - Back up critical TRMM data - Restore archive Process Order/request Service - Support of retrospective - Basic product order processing Manage System Service - Distribution status to users - Generate distribution reports - Distribution status to ECS processing component - Send staging status to ECS processing component - Inform ECS processing component of resource conflicts - Manage element resource utilization Distribution Service - Send data to ECS processing component for product generation - Distribution on TBD media types - Electronic distribution - Retrieve and distribute any file in the archive	 ME ME ME

Table 6.1-1. SDPS Driver/Capability/Services Mapping (3 of 13)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
		SDPS Scheduler - Error handling - Manual staging/destaging of data and metadata - Manual task initiation (production scripts) - Automated task initiation and monitoring	ME
		Ancillary Data Validation, Reformatting, and Regridding - TRMM platform data (CERES and LIS) - Ancillary data support	ME
Landsat-7 Support - Early Interface Testing	Landsat LPS/ECS (EDC) data transfers Landsat L0R data ingest Basic ingest services at EDC	Ingest Service (no archiving) - Receive Landsat L0R and other data - Request retransmission of missing data - Data Checking (Landsat Level 0R data) - Receive native formats - Basic electronic ingest	MC
Landsat-7 Support - Mission Support/Ground System Testing	Same as above plus: On-line archive of <TBD TB (permanent) Landsat-7 data access Landsat-7 data ingest and archive at EDC	Same as above plus: Ingest Service - Full Landsat Data Checking - Basic electronic and media ingest (media types TBD) - Generate Landsat inventory metadata - Receive Landsat metadata, L0R data and browse data, schedules, status, etc.	MC

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Table 6.1-1. SDPS Driver/Capability/Services Mapping (4 of 13)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
		Archive Service - Import and export physical media - Integrated FSMS to manage archive - Three days worth of Landsat data archived in one day - Verify data is present and accounted for - Retrieve Landsat data - Restore archive	MC
		Process Order/request Service - Support of retrospective - Basic product order processing	ME
		Manage System Service - Distribution status to users - Generate distribution reports - Manage element resource utilization	ME
		Distribution Service - Distribution on TBD media types - Electronic distribution - Retrieve and distribute any file in the archive	ME
COLOR and ADEOS II Support - Early Interface Testing	TBD	TBD	TBD
COLOR and ADEOS II Support - Mission Support/ Ground System Testing	TBD	TBD	TBD

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Table 6.1-1. SDPS Driver/Capability/Services Mapping (5 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
EOS AM-1 Support - Early Key Interface Integration Testing	SCF/ECS data transfer EDOS/ECS (GSFC) data transfer ADC/ECS data transfer Basic ingest services at GSFC EDOS Level 0 ingest	<u>Ingest Service (no archiving)</u> - Receive EDOS L0 data - Receive NOAA data products from ADC - Request retransmission of missing data - Data Checking (Level 0 data) - Receive native formats - Basic electronic ingest	MC
EOS AM-1 Support - DF & EE Testing	Same as above plus: FDF/ECS(GSFC) data transfer (orbit/data) IP (MITI)/ECS (EDC) data transfers (ASTER)	Same as above plus: <u>Ingest Service</u> - Receive EDOS, NOAA, and FDF metadata, L0-L4 data products, schedules, status, etc.	MC
EOS AM-1 Support - Simulation Readiness Testing	Same as above .	Same as above .	Same as above .
EOS AM-1 Support - Mission Support/ Ground System Testing	Same as above plus: AM-1 data processing AM-1 data access On-line archive of TBD PB (aggregate) AM-1 data (L0-L4, ancillary, etc.) ingest and archive services at all sites Basic SDPS scheduling services Ancillary data ingest and preparation	Same as above plus: <u>Ingest Service</u> - Incorporate new data formats and media <u>Archive Service</u> - Import and export physical media - Integrated FSMS to manage archive - Three days worth of EDOS data archived in one day - Back up EDOS L0 data; off site backup	MC MC

Table 6.1-1. SDPS Driver/Capability/Services Mapping (6 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
		- Restore archive	
		- Recover data from failed devices and media	
		- Verify data is present and accounted for	
		Process Order/request Service	ME
		- Support of retrospective and standing orders	
		- Process standing orders	
		- Basic product order processing	
		- Process data transfer delay or cancellation notice	
		Manage System Service	ME
		- Generate accounting information for distributed data	
		- Monitor status, cost, and performance of storage systems used	
		- Distribution status to users	
		- Generate distribution reports	
		- Distribution status to ECS processing component	
		- Send staging status to ECS processing component	
		- Inform ECS processing component of resource conflicts	
		- Manage element resource utilization	

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Table 6.1-1. SDPS Driver/Capability/Services Mapping (7 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
		Distribution Service - Send data to ECS processing component for product generation - Distribution on TBD media types - Electronic distribution - Retrieve and distribute any file in the archive - Incorporate new formats and media - Subsetting/subsampling	ME
		Algorithm Integration Support - Algorithm performance analysis and resource management tools	ME
		SDPS Scheduler - Error handling - Manual staging/destaging of data and metadata - Manual task initiation (production scripts) - Automated task initiation and monitoring - Graphical user interface	ME
		Ancillary Data Validation, Reformatting, and Regridding - AM-1 platform data - Ancillary data support - AM-1 platform data - Ancillary data support	

Table 6.1-1. SDPS Driver/Capability/Services Mapping (8 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
V0 Leapfrog -- Cross-DAAC Coincident Search	Cross-DAAC coincident search DAAC-to-DAAC message- and data- passing	Information Search Coincident/incremental search	MF
V0 Leapfrog -- Search Using Combinations of Logical Operations	Search using combinations of logical operations	Information Search Coincident/incremental search	MF
V0 Leapfrog -- Display of Data Timeline	Display of data timeline	Information Search Inventory	MF
V0 Leapfrog -- Search on Attributes across DAACs and Data Sets	Cross-DAAC coincident search Dataset specific search and results DAAC-to-DAAC message- and data- passing	Information Search Coincident/incremental search Inventory	MF
V0 Leapfrog -- Results from Search across DAACs and Data Sets	Cross-DAAC coincident search Dataset specific search and results DAAC-to-DAAC message- and data- passing	Information Search Coincident/incremental search Inventory Toolkit Services Data Visualization	MF MF
V0 Leapfrog - Simultaneous Display of Multiple Browse Products	Simultaneous display of multiple browse products Browse data product ordering	Toolkit Services Data Visualization Archival Product Requests Browse Archive Service - Retrieve data Process Order/request Service - Basic product order processing	MF ME ME ME

Table 6.1-1. SDPS Driver/Capability/Services Mapping (9 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
V0 Leapfrog -- Automated Authentication for Data Distribution	Automated authentication for data distribution	Archival Product Requests Distribution Authentication System management authentication services	MF
V0 Leapfrog -- Order History across DAACs	Order history across DAACs	Statistics Collection for Information Management	MF
V0 Leapfrog -- Manage Storage System Resource Utilization	Storage system resource management	Archive Service - Integrated FSMS to manage archive Manage System Service - Manage element resource utilization	MC ME
V0 Leapfrog -- Generate Accounting Info for Data Distribution	Generate data distribution accounting info	Cost Estimation and Account Status Interface Manage System Service - Generate accounting information for distributed data	MF MF
V0 Leapfrog -- API for Update, Query and DBA Utilities	API for update, query and DBA utilities	Application Programming Interfaces	MF
V0 Leapfrog -- Data Visualization Capabilities	Data visualization capabilities	Toolkit Services Data Visualization	MF
V0 Leapfrog -- On-line user survey at all sites	On-line user survey at all sites	Statistics Collection for Information Management User feedback	MF

Table 6.1-1. SDPS Driver/Capability/Services Mapping (10 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
V0 Leapfrog -- SCF Interface/Access	SCF/DAAC data transfer (algorithms, etc.)	<u>Ingest Service</u> - Basic electronic ingest	ME
V0/ADC Interoperability - V0 Interoperability	2-way interoperability with 8 Version 0 sites. Migrate and/or access Version 0 data archives	<u>Information Search</u> -Information search interoperability two-way order interoperability with Version 0.	MF
V0/ADC Interoperability - ADC Interoperability	2-way interoperability with NOAA and CIESIN	<u>Information Search</u> -Information search interoperability two-way order interoperability with NOAA and CIESIN.	MF
Science Support Software - TRMM CERES and LIS Version 1 Algorithm I&T	Support TRMM CERES and LIS Version 1 Algorithm I&T Full PGS toolkit support TRMM data Algorithm Integration Support Algorithm Execution/Test Support	<u>PGS Toolkit</u> - File I/O - COTS math package - Geolocation / geo coordinate transformation - Ancillary data access tools - Platform data simulation tools (ephemeris) - Status and error logging emulation(e.g. to terminal and and/or file) - Time/date conversion tools - Graphics support tools - Operations support tools - Physical Constants - PGS services/emulation tools - Metadata query and update emulation (e.g. to and from ASCII flatfile) - Design docs, user's guide, inline documentation (man pages)	ME

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Table 6.1-1. SDPS Driver/Capability/Services Mapping (11 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
		Algorithm Integration Support - Standards Checker - PGS Toolkit mandatory use compliance checker - Full submission CM capabilities - Algorithm performance analysis and resource management tools	ME
		Algorithm Execution/Test Support - Manual staging/destaging tools - Production scripts for string end-to-end processing (based on scripts developed/delivered by the SCF) - Data comparison tool	ME
Science Support Software TRMM CERES and LIS Version 2 Algorithm I&T	Same as above plus: TRMM-LIS Version 2 algorithm I&T support TRMM-CERES Version 2 algorithm I&T support Test support for TRMM end-to-end processing	Same as above plus: Algorithm Execution/ Test Support - Automatic staging/ destaging tools	Same as above
Science Support Software - EOS AM-1 Version 1 Algorithm I&T	Support EOS AM-1 Version 1 Algorithm I&T Full PGS toolkit support EOS AM-1 data	PGS Toolkit - File I/O - COTS math package - Geolocation / geo coordinate transformation - Ancillary data access tools	ME

Table 6.1-1. SDPS Driver/Capability/Services Mapping (12 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
	Algorithm Integration Support Algorithm Execution/Test Support	- Platform data simulation tools (ephemeris) - Status and error logging emulation(e.g. to terminal and and/or file) - Time/date conversion tools - Graphics support tools - Operations support tools - Physical Constants - PGS services/emulation tools - Metadata query and update emulation (e.g. to and from ASCII flatfile) - Design docs, user's guide, inline documentation (man pages)	ME
		Algorithm Integration Support - Standards Checker - PGS Toolkit mandatory use compliance checker - Full submission CM capabilities - Algorithm performance analysis and resource management tools	ME
		Algorithm Execution/Test Support - Manual staging/destaging tools - Production scripts for string end-to-end processing (based on scripts developed/delivered by the SCF) - Scheduler prototype for automated end-to-end processing - Data comparison tool	

Table 6.1-1. SDPS Driver/Capability/Services Mapping (13 of 13)

Driving Requirement/ Milestone	ECSFunctional Capability	Segment Services	Service Classification
Science Support Software - EOS AM-1 Version 2 Algorithm I&T	Same as above plus: EOS AM-1 Version 2 algorithm I&T support	Same as above plus: Algorithm Execution/Test Support - Automatic staging/destaging tools	Same as above

LEGEND: MC =   Mission Critical

                     ME =   Mission Essential

                     MF =   Mission Fulfillment

6.2 FOS Fuctional Capabilities and Services

The table below lists the FOS functional capabilities and services that are required to meet the driving requirements/milestones in Section 5.

Table 6.2-1. FOS Driver/Capability/Services Mapping (1 of 3)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
EOS AM- 1 Support - Early Interface Integration Testing	Communications Element Management	Data ingest Data transmit Integrate communications interface with CSM	MC MC MC
- Data Flow & End to End Testing	FOS infrastructure components like user interface shell, inter process communication, data base tables, communication interface with externals (e.g. , NCC, FDF, Ecom, EDOS) FOS core functionality and integration of all FOS services	Planning and Scheduling - Schedule list manager - Planning and Scheduling tools - Activity tables - Resource models and P&S DB Command Management - Build instrument and spacecraft loads and ground scripts - Validation of commands, command loads, and ground scripts Command - Command modes - Command validation - Command generation - Command/load uplink Telemetry - Ingest (packet processing) - Decommutation - Archive	MC MC MC

Table 6.2-1. FOS Driver/Capability/Services Mapping (2 of 3)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
		- Engineering unit conversion - Limits (red,/yellow,high/low,delta - Static check Element Management MOC Resource Management - MOC system configuration - Failure recovery (partial) - Multiple instrument - Multiple user support - Integrate interface with CSMS/LSM function S/C and Instrument Analysis - S/C subsystems analysis tools - Anomaly detection and analysis Data Management Run-Time Table Generation - Constraint, command, telemetry and display tables Archive Management - History log and telemetry log User Interface - Configuration displays - Window management - Alarms and events - Real-time telemetry displays (partial) - Graphs and reports (partial) - Ground script execution - Command interface IST - Provide IST functions (partial)	MC MC MC MC ME
- Simulation Readiness Testing	Same as above	Same as above	

Table 6.2-1. FOS Driver/Capability/Services Mapping (3 of 3)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
- Mission Support/Ground System Testing	Same as above, plus: Full system integraton and completion of performance analysis required for AM-1 launch.	Same as above, plus: Planning and Scheduling - ASTER models - Activity builder - Analysis tools and Conflict Mgr	MC
		Command Management - Best estimates for memory - Flight software updates	MC
		Command - Memory dump compares - Telemetry verification - Command verification - Critical commands	MC
		Telemetry - Archive of memory dump data - Pseudotelemetry - Real-time statistics - Subsetting - S/C clock drift computations - Replay	MC
		Element Management MOC Resource Management - Failure recovery (final)	MC
		S/C and Instrument Analysis	MC

LEGEND: MC =   Mission Critical

                  ME =   Mission Essential

                  MF =   Mission Fulfillment

6.3 CSMS Functional Capabilities and Services

The table below lists the CSMS functional capabilities and services that are required to meet the driving requirements/milestones in Section 5.

Table 6.3-1. CSMS Driver/Capability/Services Mapping (1 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification

TRMM Support
• Early Interface Testing
	PACOR/ECS(LaRC) data transfer
	PACOR/ECS(MSFC) data transfer
	TSDIS/ECS(MSFC) data transfer
	TSDIS/ECS(GSFC) data transfer
	Basic ingest services at 3 sites (GSFC, MSFC, and LaRC)
	TRMM CERES and LIS Level 0 ingest
	TRMM data product ingest
	SCF/ECS (MSFC) data transfer (algorithms, algorithm support data)
	NSI I/F
		<u>Networking Service</u>
		• WAN connectivity:
		  GSFC SDPF/PACOR-LaRC DAAC (via Nascom)
		  GSFC SDPF/PACOR-MSFC DAAC (via Nascom)
		  GSFC TSDIS-MSFC DAAC
		• LAN connectivity:
		  as required for above WAN-to-ECS DAAC LANs
		  TSDIS-GSFC DAAC
		• ESN connectivity (for SCF interface to ECS)
		• TCP/IP suite
		• directory (DNS)
		• file transfers
		• interprocess
		
		<u>Site Management Service</u>
		• basic network mgmt for LANs
		• basic network mgmt for WANs
		• management framework product
		• history log
		• configuration management source code control system
			MC
			
			MC
			
			MC
			
			MC
			MC
			MC
			MC
			
			MC
			
			MC
			
			MC
			
			ME
			ME

Table 6.3-1. CSMS Driver/Capability/Services Mapping (2 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification

TRMM Support
• Mission Support/Ground System Testing
	Same as above plus:
	
	TRMM CERES/LIS data processing
	TRMM CERES & LIS data (L0) ingest and archive services at 2 sites (LaRC and MSFC).
	TRMM data access
	On-line archive of 125 TB (aggregate)
	TRMM data (L1-L4, ancillary, etc.) ingest and archive services at 2 sites (GSFC, MSFC)
	Basic SDPS scheduling services
	Ancillary data ingest and preparation
	NASCOM I/F
	ECOM I/F
	NSI I/F
	PSCN I/F
		Same as above plus:
		
		Networking Service
		• WAN connectivity:
		  ECS (GSFC, MSFC, LaRC) - NASDA DDMS (may be via media only)
		• LAN connectivity:
		  LaRC DAAC - CERES
		  MSFC DAAC - LIS
		• user access WAN/LAN connectivity:
		  NSI - GSFC
		  NSI - LaRC
		  NSI - MSFC
		• session (GUI: X/Motif; menuing)
		• distributed time
		• remote data
		  - distributed file system
		  - DBMS client/server
		• network security
		  - authentication
		  - authorization
		  - address filtering
		• comm interfaces to PGS toolkit
		• multi-site directory (X.500)
		
		Site management
		• fault management
		  -alarm processing/display
		  -vendor diagnostics
		  -event logging (incl apps.)
		  -std analysis of event logs
		  -cross-site data aggregation
			
			MC
			
			MC
			
			MC
			
			MC
			
			MC
			MC
			
			MC
			
			MC
			
			MC
			
			ME

Table 6.3-1. CSMS Driver/Capability/Services Mapping (3 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification

TRMM Support
• Mission Support/Ground System Testing (cont'd)
		• configuration management
		  - resource mgmt (reconfig)
		  - resource discovery/display
		  - s/w distribution (incl toolkits)
			ME

		• security management
		  - event logging (incl logon/off)
		  - std analysis of event logs
		  - virus checks
			ME

		• performance management
		  - cross-site data aggregation
		  - event logging (incl start/stop)
		  - std analysis of event logs
		  - trending and statistical analysis
			MC

		• report generation
		  - std analysis of event logs
		  - 4GL reports
			ME

		• directory information
		  - all Level 3 reqts
		  - user registration
		  - network help desk
			ME

		• Accounting Management - billing for TRMM	
Landsat-7 Support • Early interface testing	Landsat LPS/ECS (EDC) data transfers Landsat L0R data ingest Basic ingest services at EDC	<u>Networking Service</u> • LAN connectivity: -L7 LPS - EDC DAAC's ECS LAN (assumes LAN)	MC
		• TCP/IP suite	MC
		• file transfers	MC
		• interprocess	MC
		<u>Site Management Service</u> • configuration management source code control system	ME

Table 6.3-1. CSMS Driver/Capability/Services Mapping (4 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
Landsat-7 Support • Mission Support/Ground System Testing	Same as above plus: On-line archive of TBD (permanent)	Same as above plus: <u>Networking Service</u> • user access WAN/LAN connectivity: -NSI - EDC	MC
		• directory (DNS)	MC
		• session (GUI: X/Motif; menuing)	MC
		• distributed time	MC

		• remote data
		  - distributed file system
		  - DBMS client/server
			MC

		• network security
		  - authentication
		  - authorization
		  - address filtering
			MC

		• multi-site directory (X.500)	MC

		<u>Site management</u>
		• fault management
		  -alarm processing/display
		  -vendor diagnostics
		  -event logging (incl apps.)
		  -std analysis of event logs
			ME

		• configuration management
		  - resource mgmt (reconfig)
		  - resource discovery/display
		  - s/w distribution (incl toolkits)
			ME

		• acctg/accountability management - billing for Landsat use??	ME

		• security management
		  - event logging (incl logon/off)
		  - std analysis of event logs
		  - virus checks
			MC

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Table 6.3-1. CSMS Driver/Capability/Services Mapping (5 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
		• performance management - event logging (incl start/stop) - std analysis of event logs - trending and statistical analysis	ME
		• report generation - std analysis of event logs - 4GL reports	ME
		• directory information - all Level 3 reqts - user registration	ME
		• network help desk	ME
COLOR and ADEOS II Support • Early Interface Testing	TBD	TBD	
COLOR and ADEOS II Support • Mission Support/Ground System Testing	TBD	TBD	
EOS AM-1 Support • Early Key Interface Integration Testing	SCF/ECS data transfer EDOS/ECS (GSFC) data transfer ADC /ECS data transfer EDOS Level 0 data archiving Basic ingest services at GSFC EDOS Level 0 ingest	<u>Networking Service</u> • WAN/LAN connectivity: -GSFC: ECOM (EDOS) - EOC/ICC -GSFC: ECOM (EDOS) - DAAC -GSFC: TBD SCF - DAAC -GSFC: TBD ADC - DAAC • TCP/IP suite • directory (DNS) • file transfers • interprocess	MC MC MC MC MC

Table 6.3-1. CSMS Driver/Capability/Services Mapping (6 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
		<u>Site Management Service</u> • basic network mgmt for LANs • basic network mgmt for WANs • management framework product • history log • configuration management -source code control system	MC MC MC ME ME
EOS AM-1 Support • DF & EE Testing	Same as above plus FDF/ECS(GSFC) data transfer (orbit/data) IP (MITI)/ECS (EDC) data transfers (ASTER) EOC/ECS(GSFC) data transfers On-line archive of TBD TB	Same as above, plus: <u>Networking Service</u> • WAN/LAN connectivity: -GSFC: ECOM - EOC/ICC -EDC: DAAC(?) - MITI(?) (NSI??)	MC
EOS AM-1 Support • Simulation Readiness Testing	Same as above.	Same as above.	Same as above.
EOS AM-1 Support • Mission Support/Ground System Testing	Same as above plus:	Same as above, plus: <u>Networking Services</u> • directory (DNS) • session (GUI: X/Motif; menuing) • distributed time • remote data - distributed file system - DBMS client/server	

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Table 6.3-1. CSMS Driver/Capability/Services Mapping (7 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification

EOS AM-1 Support
• Mission Support/Ground System Testing
	Same as above plus:	Same as above, plus:
		
		Networking Services
		• directory (DNS)
		• session (GUI: X/Motif; menuing)
		• distributed time
		• remote data
		  - distributed file system
		  - DBMS client/server
		• network security
		  - authentication
		  - authorization
		  - address filtering
		• multi-site directory (X.500)
		
		Site management
		• fault management
		  -alarm processing/display
		  -vendor diagnostics
		  -event logging (incl apps.)
		  -std analysis of event logs
		• configuration management
		  - resource mgmt (reconfig)
		  - resource discovery/display
		  - s/w distribution (incl toolkits)
		  - event logging (reconfigs)
		  - cross-site data aggregation
		• acctg/accountability management
		  - billing for EOS use??
		• security management
		  - event logging (incl logon/off)
		  - std analysis of event logs
		  - virus checks
			MC
			MC
			
			MC
			MC
			
			MC
			
			MC
			
			ME
			
			ME
			
			ME
			
			MC

Table 6.3-1. CSMS Driver/Capability/Services Mapping (8 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification

		• performance management
		  - cross-site data aggregation
		  - event logging (incl start/stop)
		  - std analysis of event logs
		  - trending and statistical analysis
			ME

		• report generation
		  - std analysis of event logs
		  - 4GL reports
			ME

		• directory information
		  - all Level 3 reqts
		  - user registration
			ME

		• network help desk	ME
V0/ADC Interoperability • V0 Interoperability	2-way interoperability with 8 Version 0 Sites	<u>Networking Service</u> • DCE/non-DCE interoperability -Support for V0 interoperability (network interface - TBD)	MF
V0/ADC Interoperability • ADC Interoperability	2-way interoperability with Univ of Wisc & CIESIN	<u>Networking Service</u> • WAN/LAN connectivity: -TBD • network help desk	MF
Science Support Software • TRMM CERES and LIS Version 1 Algorithm I&T	Support TRMM CERES and LIS Version 1 Algorithm I&T Full PGS toolkit support TRMM data Algorithm Integration Support Algorithm Execution/Test Support	<u>Networking Service</u> • PGS toolkit interfaces to ESN	ME

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Table 6.3-1. CSMS Driver/Capability/Services Mapping (9 of 9)

Driving Requirement/ Milestone	ECS Functional Capability	Segment Services	Service Classification
Science Support Software • TRMM CERES and LIS Version 2 Algorithm I&T	Same as above plus: TRMM-LIS Version 2 algorithm I&T support TRMM-CERES Version 2 algorithm I&T support	Same as above.	Same as above
Science Support Software • EOS AM-1 Version 2 Algorithm I&T	Support EOS AM-1 Version 1 Algorithm I&T Full PGS toolkit support EOS AM-1 data Algorithm Integration Support Algorithm Execution/Test Support	Same as above.	Same as above.

LEGEND: MC =   Mission Critical

                        ME =   Mission Essential

                        MF =   Mission Fulfilment

7. Release Identification

7.1 Release Identification

This section identifies the missions that are supported by each ECS Release and it provides a mapping of the driving requirements/milestones to ECS Releases. The driving requirements/milestones associated with each mission are described in Section 5.0, and the ECS functional capabilities and services required to meet these driving requirements/milestones are described in Section 6.0. Finally, Section 10.0 provides a detailed mapping of the ECS functional capabilities and services to the Releases identified below.

7.2 Release Support to Missions

The ECS will be delivered in four Releases (A to D) and an Interim Release (IR-1). The four Releases support the missions shown below, and the Interim Release is an early release of the ECS to support early TRMM interface testing. Interim Release 1 is developed with the same rigor and formal release track development process as Releases A, B, C and D with two exceptions. First, Acceptance Testing and Independent Verification and Validation (IV&V) is not performed on IR-1. Second, IR-1 does not have a separate Critical Design Review (CDR). This review is included in the Release A CDR. These exceptions are reflected in the Release schedules presented in Section 13.

Table 7-1. Release Missions

Release	Mission(s) Supported
Interim Release 1	TRMM, Early Interface Testing
Release A	TRMM Mission; Landsat-7 Early Interface Testing; EOS AM-1 Early Interface Testing, Data Flow & End-to-End Testing and Simulation Readiness Testing
Release B	EOS AM-1 Mission and Mission Simulations, Landsat-7, COLOR and ADEOS II Missions
Release C*	n/a
Release D*	n/a

*Evolutionary Enhancements

Note that Release A serves the dual purpose of supporting the TRMM mission and it provides sufficient FOS capability to support EOS AM-1 testing.

7.3　Mapping of Driving Requirements/Milestones to Releases

This section provides a mapping of the driving requirements/milestones listed in Section 6.0 to the ECS Releases identified above. This mapping provides the basis for the detailed mapping of the ECS functional capabilities and services to Releases which is given in Section 10.0.

Table 7-2. Mapping of Driving Requirements/Milestones to Releases (1 of 2)

Driving Requirement/ Milestone	ECS Release
TRMM Support	
- Early Interface Testing	Interim Release 1
- Mission Support/Ground System Testing	Release A
Landsat-7 Support	
-Early Interface Testing	Release A
- Mission Support/Ground System Testing	Release B
COLOR and ADEOS II Support	
- Early Interface Testing	Release A
- Mission Support/Ground System Testing	Release B
EOS AM-1 Support	
- Early Interface Testing	Release A
- Mission Support/Ground System Testing	Release A & B
V0/ADC Interoperability	
- V0 Interoperability	Release A* & B
- ADC Interoperability	Release A* & B
V0 Leapfrog	
- Cross DAAC Coincident Search	Release A* & B
- Search Using Combinations of Logical Operators	Release B & C
- Display of Data Timeline	Release A*
- Search on Attributes across DAACs & Data Sets	Release B
- Results from Search across DAACs & Data Sets	Release B
- Simultaneous Display of Multiple Browse Data	Release B
- Automated Authentication for Data Distribution	Release B
- Order History Across DAACs	Release B
- Manage Storage System Resource Utilization	Release A & B
- Generate Accounting Info. for Data Distribution	Release B
- API for Update, Query and DBA Utilities	Release A
- Data Visualization Capabilities	Release A
- On-line User Survey at all Sites	Release A
- SCF Interface/Access	Release A
- Multiple DAAC Orders	Release B
Science Software Support	
- TRMM CERES and LIS Version 1 Algorithm I&T	Interim Release 1

Table 7-2. Mapping of Driving Requirements/Milestones to Releases (2 of 2)

Driving Requirement/ Milestone	ECS Release
- TRMM CERES and LIS Version 2 Algorithm I&T	Release A
- EOS AM-1 Beta Algorithm I&T	Interim Release 1
- EOS AM-1 Version 1 Algorithm I&T	Release A
- EOS AM-1 Version 2 Algorithm I&T	Releases B

* V0 provided cabability.

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8. Mapping of ECS SOW Functionality to Releases

8.1 Mapping of ECS SOW Functionality to Releases

This section provides an updated mapping of ECS functionality in Table 2.5-2 of the SOW to Releases A to D identified in Section 6. The updated table shown below will be used as the basis for CCRs to the SOW. More detailed descriptions of the functional capabilities and services provided for each Release is contained in Section 10.0.

Table 8-1. ECS Rephased Implementation (1 of 3)

	RELEASE A	**RELEASE B**	**RELEASE C**	**RELEASE D**
Information Management and Archive Functions	- 125 TBYTE Archive - 4 Site Archive and Information Management Services (LaRC, MSFC, GSFC and EDC) - Support Migration of V0 Data to 4 Archive Sites - IMS Archive Capacity and Functionality to support TRMM - Information Management Services Software available to CIESIN SEDAC - Network Access and Distribution of Data Holdings - Subsetting to Granule Level - Security and Backup Services	- Full Functionality and Performance, Launch Ready for EOS AM-1 (Landsat-7 and COLOR) - All V0 Data Migrated to ECS Archive - Information Management Services to ORNL - Support migration of V0 data to archive sites	Release B Capabilities Plus: - Evolutionary Enhancements	Release C Capabilities Plus: - Archive Capacity for 1 Year of Operations Past End of Contract - Planned Upgrades for Increased Capacity Requirements and Equipment Replacement - Evolutionary Enhancements

Table 8-1. ECS Rephased Implementation (2 of 3)

	RELEASE A	RELEASE B	RELEASE C	RELEASE D
	- Hard Media Shipping and Handling Services - Access to all authorized Users - Interoperable with ADCs and V0			
Science Processing	- 2 Site (LaRC and MSFC) PGS Services to support TRMM - Full Algorithm Environment for Final I&T and Performance Testing for TRMM - ESN Interface for Testing - Algorithm I & T Environments for EOS AM-1 at EDC, GSFC and LaRC	- Full Functionality and Performance, Launch Ready for EOS AM-1, COLOR	Release B Capabilities Plus: - Full Reprocessing Capacity to Support EOS AM - Evolutionary Enhancements	Release C Capabilities Plus: - Planned Upgrades for Increased Capacity Requirements and Equipment Replacements - Evolutionary Enhancements
Mission Operations	- Initial Mission Operations Capability for Interface Testing - Support to Early Instrument and Spacecraft Command and Control Testing for EOS AM-1 - ECOM Interface for Testing - Functionality for Flight Operations Segment Institutional Interfaces (e.g., FDF, SN, NCC), EDOS and ECOM	- Full Functionality and Performance, Launch Ready for EOS AM-1 - Full Instrument and Spacecraft Testing Support for EOS AM-1	- Spacecraft Specific Updates - Evolutionary Enhancements	- Spacecraft Specific Updates - Planned Upgrades for Increased Capacity Requirements and Equipment Replacement - Evolutionary Enhancements

Table 8-1. ECS Rephased Implementation (3 of 3)

	RELEASE A	RELEASE B	RELEASE C	RELEASE D
Networks	- As Required	- Full Functionality and Performance	- Evolutionary Enhancements	Planned Upgrades for Increased Capacity Requirements and Equipment Replacement - Evolutionary Enhancements
System Management	- As Required	- Full Functionality and Performance	- Evolutionary Enhancements	- Planned Upgrades for Increased Capacity Requirements and Equipment Replacement - Evolutionary Enhancements
Launch Version	TRMM	- EOS AM-1 ADEOS II Landsat-7, COLOR	- EOS PM, AERO	ALT, CHEM

The table shown above represents the ECS contract baseline for Table 2.5-2 of the SOW with CN 13 incorporated (contract MOD22, CCR 505-01-41-065).

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9. ECS Evaluation Package Plan

A portion of ECS functionality is developed on the Incremental Track and is first deployed to users for evaluation as part of Evaluation Packages (EP). An EP is a delivery mechanism that provides functional capabilities for a short time period for user evaluation and feedback of suggested improvements in subsequent incremental cycles. A description of the EP process and the identification of planned EPs and their functionality is provided in a white paper entitled "ECS Evaluation Package Strategic Plan; ". The paper is available in draft form pending an update to incorporate any changes in EP planning emanating from this release plan and from the current ECS architecture studies underway.

The current EP plan (prior to referenced update) identifies EPs 1 through 5. One additional EP (EP-6) is currently being defined to provide functionality required in Release A for TRMM support. The schedules in Section 13 show EP-6 being integrated into into Release A.   EP-6 will be integrated with the software on the formal track for Release A, and will go through System I&T prior to the Consent to Ship for the Release.

It is generally accepted that EPs will be defined to provide similar evaluations of functionality and feedback for Releases B through D, but their content has not been projected at this time. The update of the EP White Paper will include this additional detail.

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10. Detailed Mapping of ECS Functionality to Releases

10.1 Mapping of ECS Functionality to Releases IR-1, A and B

This section provides a detailed mapping of ECS functional capabilities and services listed in Section 6 to the Releases identified in Section 7. The functional capabilities and services are mapped to Releases A & B and Interim Release 1. A preliminary mapping of functional capabilities and services to Release C/D is presented in Section 10.2. The functional capabilities and services shown in the table for Release A contains all the capabilities and services provided in Interim Release 1. Similarly, the functional capabilities and services shown in the table for Release B contains all the capabilities and services provided in Release A. Information is also provided in the table for sites affected, release objectives, and external interfaces.

10.2 Mapping of ECS Functionality to Release C

This section lists the SDPS and CSMS functional capabilities that are contained in Release C. The functional capabilities and services for Release C represent the evolutionary enhancements that will be provided by ECS.

10.3 Mapping of ECS Functionality to Release D (provide with Change Order #2)

Table 10-1. Release Capabilities Mapping for Releases IR-1, A & B
(Located in a separate file)

Table 10-2. Release Capabilities Mapping for Releases C & D
(Located in a separate file)

10.3 Toolkit Mapping

This section provides a description of the PGS Toolkits that will be delivered by the ECS Project. These Toolkits are delivered intially to Science Computing Facility, and are later integrated in the formal Releases for delivery to the ECS DAACs. The table below describes the functionality contained in the PGS Toolkits, and it maps the functionality to a Toolkit Release and to a Formal Release.

Table 10-3. Toolkit Capabilities Mapping

Release	Functionality/Capability
TK 1	Users Guide; EOS AM platform orbit/attitude emulation
TK 2	Geolocation routines; file I/O and error and status message handling; Users Guide for time and data conversion; coordinate system conversion; process control tools
TK 3	Preliminary ancillary data ingest interface; coordinate conversion; complete generic I/O and error/status message handling for SCF development environment; toolkit modifications based on user feedback and requirements of the new architecture HDF primer for V.1; updated Users Guide; Toolkit Primer; updated requirements specification; memory management tools
TK 3	Initial algorithm I&T environment toolkit; generic file access
TK 4	Additional ancillary data ingest interface; geophysical coordinate conversion; Level 0 data ingest emulation and access tools; geolocation using Level 0 data physical constants and unit conversions; HDF-EOS design document; HDF-EOS Users Guide; updated Users Guide
TK 5	Full PGS interface; satisfaction of requirements identified; modification to previous tools; metadata access and manipulation; preliminary HDF-EOS library; additional ancillary data access tools
IR 1	Full algorithm integration PGS toolkit with manual process initiation

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11. Mapping of ECS Architecture to Releases

This section identifies the ECS Architecture as described in each of the Segment Design Specifications (DID 305) and Segment Release Plans (DID 307), and maps that architecture to ECS Releases. The mapping uses the Segment Design Specifications and Release Plans presented at the "PDR Season" and maps its architecture to Interim Release 1, Release A and Release B. The mapping to Releases C and D will be provided in later issues of this document.

11.1 Identification of ECS Architecture

The ECS System Architecture is composed of three Segments: a Science Data Processing Segment (SDPS), a Flight Operations Segment (FOS) and a Communications and Systems Management Segment (CSMS). The paragraphs that follow identify the Subsystems and Configuration Items (CIs) associated with each of the three ECS Segments.

11.1.1   Deleted

11.1.2   Deleted

11.1.3   Deleted

11.2 Mapping of Segment Architecture to Releases

This section maps the Subsystems and Configuration Items (CIs) for each Segment to ECS Releases IR-1, A, and B. The mapping is done through a series of tables in the paragraphs that follow. The tables indicate for each Subsystem and CI the Release(s) that will contain the component. This is indicated with an "X" in the Release column(s). A detailed description of the Segment architecture is contained in the Segment Design Specifications (DID 305). The ECS Segment Release Plans (DID 307) contain a detailed description of the architecture components that are delivered for each Release.

Many of the Subsystems and CIs listed in the tables below are mapped to multiple Releases. This is shown with an "X" in the IR-1, Release A and/or Release B columns, and indicates that a component will have a different implementation in each Release. A description of the services implementation for each Release is presented in Section 10 (Table 10-1).

11.2.1   Mapping of SDPS Architecture to Releases

The SDPS consists of seven subsystems: client, interoperability, data management, data server, ingest, planning and data processing. The mapping of these subsystems and their associated CIs is shown in the table below.

Table 11.2-1. Mapping of SDPS Subsystems and CIs to Releases

Subsystem/CI	IR-1	Release A	Release B
Client Subsystem(CLS)			
Desktop CSCI (DESKT)		X	X
Workbench CSCI (WKBCH)		X	X
Interoperability System (IOS)			
Advertising Service CSCI (ADSRV)		X	X
Advertising Service HWCI (ADSHW)		X	X
Data Management Subsystem (DMS)			
Data Dictionary CSCI (DDICT)			X
Local Information Manager CSCI (LIMGR)			X
Distributed Information Manager CSCI (DIMGR)			X
Version of Interoperability Gateway CSCI (GTWAY)		X	X
Data Management HWCI (DMGHW)		X	X
Data Server Subsystem (DSS)			
Science Data Server CSCI (SDSRV)		X	X
Document Data Server CSCI (DDSRV)		X	X
Storage Management CSCI (STMGT)	X	X	X
Data Distribution Service CSCI (DDIST)		X	X
Access and Control Management HWCI (ACMHW)		X	X
Working Storage HWCI (WKSHW)		X	X
Data Repository HWCI (DRPHW)		X	X
Distribution and Ingest Peripheral HWCI (DIPHW)		X	X
Ingest Subsystem (INS)			
Ingest Services CSCI (INGST)	X	X	X
Ingest Client HWCI (ICLHW)	X	X	X
Planning Subsystem (PLS)			
Production Planning CSCI (PLANG)		X	X
Planning HWCI (PLNHW)		X	X
Data Processing Subsystem (DPS)			
Processing CSCI (PRONG)		X	X
SDP Toolkit CSCI (SDPTK)	X		
Algorithm I&T CSCI (AITTL)	X	X	X
Science Processing HWCI (SPRHW)	X	X	X
Algorithm Integration and Test HWCI (AITHW)	X	X	X
Algorithm Quality Assurance (QA) HWCI (AQAHW)		X	X

11.2.2   Mapping of FOS Architecture to Releases

The FOS consists of eight subsystems: planning and scheduling , command management, command, telemetry processing, spacecraft and instrument analysis, data management, resource management and user interface. The mapping of these subsystems and their associated CIs is shown in the table below.

Table 11.2-2. Mapping of FOS Subsystems and CIs to Releases

Subsystem/CI	IR-1	Release A	Release B
Planning and Scheduling Subsystem			
Planning and Scheduling CSCI (PAS)		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X
Command Management Subsystem			
Command Management CSCI (CMS)		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X
Command Subsystem			
Command CSCI (CMD)		X	X
Real-Time Server Hardware CI		X	X
User Station Hardware CI		X	X
Telemetry Subsystem			
Telemetry CSCI (TLM)		X	X
Real-Time Server Hardware CI		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X
Analysis Subsystem			
Analysis CSCI (ANA)		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X
Data Management Subsystem			
Data Management CSCI (DMS)		X	X
Data Storage Unit Hardware CI		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X
Resource Management Subsystem			
Resource Management CSCI (RMS)		X	X
Real-Time Server Hardware CI		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X
User Interface Subsystem			
User Interface CSCI (FUI)		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X
Real-Time Contact Subsystem			
Real-Time Contact CSCI (RCM)		X	X
Real-Time Server Hardware CI		X	X
Data Server Hardware CI		X	X
User Station Hardware CI		X	X

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11.2.3 Mapping of CSMS Architecture to Releases

The CSMS consists of three subsystems: management, communications, and internetworking. The mapping of these subsystems and their associated CIs is shown in the table below.

Table 11.2-3. Mapping of CSMS Subsystems and CIs to Releases

Subsystem/CI	IR-1	Release A	Release B
Communications Subsystem (CSS)			
Distributed Computing Software CI (DCCI)	X	X	X
Distributed Communications Hardware CI (DCHCI)	X	X	X
Management Subsystem (MSS)			
Management Software CI (MCI)	X	X	X
Management Agents CI (MACI)	X	X	X
Management Logistics CI (MLCI)	X	X	X
Management Hardware CI (MHCI)	X	X	X
Internetworking Subsystem (ISS)			
Internetworking CI (INCI)	X	X	
Internetworking Hardware CI (INHCI)	X	X	X

12. Description of Builds/Threads for ECS Releases

This section summarizes the ECS Builds/Threads that will be used to integrate the ECS architectural components identified in Section 11 into an operational configuration for Interim Release 1, Release A and Release B. The mapping to Releases C and D will be provided in a later issue of this document. The Builds/Threads shown in the figures below are taken from the ECS System Integration and Test Plan (DID 402). A detailed description of the ECS Builds/Threads is presented in DID 402, and section provides exerts from Sections 4, 5 and 6.

12.1 Interim Release 1 System Builds

The system level Builds/Threads for this Release are described in the ECS System Integration and Test Plan (DID 402). They will be updated in accordance with the DID submittal requirements.

12.2 Release A System Builds

The system level Builds/Threads for this Release are described in the ECS System Integration and Test Plan (DID 402). They will be updated in accordance with the DID submittal requirements.

12.3 Release B System Builds

The system level Builds/Threads for this Release are described in the ECS System Integration and Test Plan (DID 402). They will be updated in accordance with the DID submittal requirements.

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13. ECS Schedule for Releases

This section provides the schedules for the functional capabilities and services for each Release of the ECS. It also contains the external ECS driving mission milestones/schedules.

13.1 Release Schedules

Figure 13.1-1 below presents the schedules for ECS Release A - D and Interim Release 1. This includes intermediate milestones for the formal development track for each Release, the overall COTS procurement, delivery and installation schedules for each site activation, the EOS/ECS Ground System test schedules, and the launch milestones for each mission supported by the ECS. Also shown in the figure and Table 13.1-1 are milestones for the delivery of each Release to the operational sites and milestones for the integration of Evaluation Packages (EPs) with the formal Release track.

Table 13.1-1. ECS Replan Release Schedules

REL	IR-1	A	B	C	D
Start	30 Mar 93	30 Mar 93	1 Feb 93	1 Sep 97	1 Dec 99
RIR	na	na	31 Mar 95	1 Oct 97	1 Jan 00
SRR	15 Sep 93	15 Sep 93	na	na	na
SDR	28 Jun 94	28 Jun 94	na	na	na
PDR	28 Feb 95	16 Dec 94 (FOS) 28 Feb 95 (Wrap-up)	16 Dec 94 (FOS)	na	na
IDR	na	na	3 Nov 95 (SDPS, CSMS)	1 Mar 98	1 May 00
CDR	18 Aug 95	19 Oct 95 (FOS) 18 Aug 95 (SDPS, CSMS)	19 Oct 95 (FOS) 19 Apr 96 (SDPS, CSMS)	1 Oct 98	1 Oct 00
TRR	na	1 Apr 96	1 Jan 97	1 Jul 99	1 May 01
ETR	na	1 Jun 96	1 Mar 97	1 Sep 99	1 Jul 01
SORR	na	1 Oct 96	1 Jun 97	1 Nov 99	1 Sep 01
CSR	3 Jan 96	1 Oct 96	1 Jun 97	1 Nov 99	1 Sep 01
RRR	na	1 Dec 96	1 Sep 97	1 Dec 99	1 Oct 01

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ECS Level 1 Master Development Schedule

August 1995 Releases IR-1, A, B
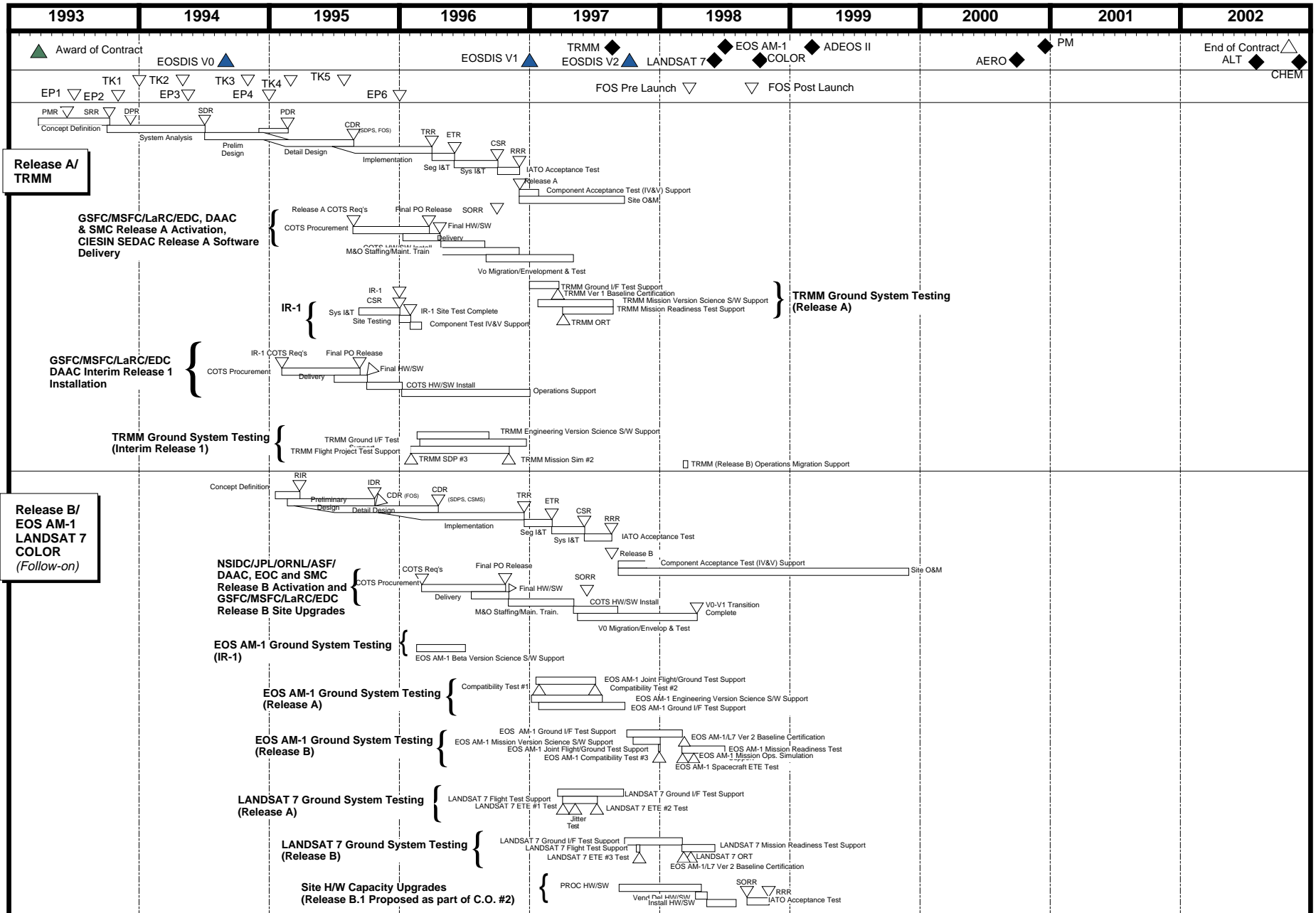
Figure 13.1-1. ECS Release Schedule (1 of 2)

ECS Level 1 Master Development Schedule

August 1995 Releases C & D

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002

Release C
(Follow-on)

RIR
IDR
CDR
Concept Definition
Prelim Design
Detail Design
Implementation
TRR
ETR
CSR
Seg I&T
Sys I&T
RRR
IATO Acceptance Test

Release C
IV&V
Site O&M

COTS Req's Final PO Release
Site Upgrades (Release C)
COTS Procurement
Final HW/SW
Delivery
COTS HW/SW Install
SORR
M&O Staffing/Maint. train.

Site H/W Capacity Upgrades
(Release C.1 proposed as part of C.O. #2)
Proc HW/SW
Vend Del HW/SW
Install HW/SW
SORR
RRR
IATO Acceptance Test

Release D
(Follow-on)

RIR
IDR
CDR
Concept Definition
Prelim Design
Detail Design
Implementation
TRR
ETR
CSR
Seg I&T
Sys I&T
RRR
IATO Acceptance Test

COTS Req's Final PO Release
Site Upgrades (Release D)
COTS Procurement
Final HW/SW
Delivery HW/SW Install
ETR
Release D
IV&V
Site O&M
SORR
M&O Staffing/Maint. train.

Site H/W Capacity Upgrades
(Release D.1 proposed as part of C.O. #2)
PROC HW/SW
Vend Del HW/SW
Install HW/SW
SORR RRR
IATO Acceptance Test

Figure 13.1-1. ECS Release Schedule (2 of 2)

The SRR and SDR milestones shown in the figure are the System Requirements Review and the System Design Review for all Releases of the ECS. The PDR/IDR, CDR and other intermediate milestones are shown for Release A, B, C and D. Interim Release 1 shares the same PDR and CDR with Release A, but has its own unique CSR. IATO Acceptance Test is performed on Releases A, B, C and D. It is not performed on Interim Release 1, since it is used to support early TRMM Interface Testing and is completely replaced by Release A.

13.2 Driving Mission Milestones/Schedules

This section lists the driving mission milestones/schedules that were used to develop the Release schedules shown above. These are presented in the tables below for launch dates, EOS Ground System test schedules and science software I&T schedules.

Table 13.2-1. Mission Launch Dates

Mission	Launch Date
TRMM	17 August, 1997
Landsat-7	30 May 1998
COLOR	01 October, 1998
EOS AM-1	30 June, 1998
ADEOS II	28 February 1999
AERO	September, 2000
EOS PM-1	December, 2000
ALT	July, 2002
CHEM	December, 2002

The schedules for EOS Ground System testing are contained in the EOS Ground System Integration Plan. The schedules show a need for the ECS to support the four phases of ground system testing according to the table below.

Table 13.2-2. EOS Ground System Testing Schedule Template

Test Phase	ECS Need Date
Interface Testing	Launch - 30 months
Data Flow & End-to-End Testing	Launch - 18 months
Simulation Testing	Launch - 13 months
Ground System Testing	Launch - 09 months

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The schedules for ECS support to Science Software I&T are given in the table below and are base on the drivers discussed in Section 5.11.

Table 13.2-3. Science Software Algorithm I&T Support Dates

Science Software	Science Software Algorithm I & T Start Date
BETA Delivery (Beta Version)	L - 36 through L - 30 months
Version 1 (Engineering Version)	L - 24 through L - 20 months
Version 2 (Mission Version)	L - 12 through L- 10 months

13.3 Site Activation Schedules

The figure below presents the schedules for the DAAC, EOC and SMC activation for Release IR-1, A and B. The schedules show for each site the procurement, COTS hardware/software delivery, COTS installation, M & O training and M & O support. The schedule for long lead time COTS is also shown. These schedules are based upon the ECS Master schedule presented in Figure 13.1-1 and are the schedules contained in the ECS Intermediate Logic Network (ILN) for procurement and installation of COTS hardware/software. The site activation schedules are sorted by Release in Figure 13.3-1, and are sorted by site Figure 13.3-2.

Figure 13.3-1. ECS Site Activation Schedules - (By Release)

(Available in hardcopy only)

Figure 13.3-2. ECS Site Activation Schedules - (By Site)

(Available in hardcopy only)

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13.4 Science Software Algorithm I & T Schedules

The figure below presents the schedules for science software algorithm development and algorithm I & T for the TRMM and the EOS AM - 1 spacecraft. The schedules are based upon the ECS Master Schedules presented in Figure 13.1-1 and the ECS Intermediate Logic Network (ILN).

Figure 13.4-1. Science Software Algorithm I & T Schedules

(Available in hardcopy only)

13.5 Version 0 (V0) Data Migration

Because of the value of past remote sensing data to Global Change Research, NASA has elected to migrate Version 0 data to ECS as part of the overall V0-to-V1 transition. ECS is being designed for a long life cycle (at least two decades beyond the launch of the first EOS spacecraft) with architectural features that facilitate technology upgrades and evolution. Migration to ECS will ensure continued maintenance of these important historical Earth science data. After migration, ECS will provide information management and data archive and distribution functions for past NASA Earth science flight missions and other Earth science data held by NASA. Users will gain access to improved services, new functions, and better performance. V0-to-V1 migration is being planned from a users' point of view to ensure continuous data availability throughout the migration process.

The data migration process for each data product, or group of similar data products, is depicted in Figure 13.5-1 and consists of two phases: the Engineering Phase and Operations Phase. Both phases are performed by the ECS V0 data migration team. The Engineering Phase includes: 1) resource analysis of the data and metadata, 2) development of any software and procedures, and 3) benchmark migration testing of samples to prove the process. During resource analysis, ECS will identify and document the effort required to convert and migrate the candidate V0 data product and metadata. Software and procedures are developed, constrained by the available budget, to perform data conversion to HDF-EOS, map V0 metadata to the ECS metadata model, and derive new metadata. Benchmark testing, with a sample of the migrated data and metadata, is performed in the ECS Development Facility environment, and at the DAAC, on the installed ECS system, to demonstrate readiness for operational migration.

The Operations Phase accomplishes the preprocessing of the V0 data and metadata, ingest into ECS, and the operational population of an ECS Data Server, i.e. the physical migration of the data and metadata from V0 to ECS. At the end of the migration of a data product a Data Readiness Review will be held with ESDIS and DAAC personnel to verify the operational readiness of the data product. Upon successful completion of the review, operational responsibility will transfer from V0 to ECS. For ORNL, the data will not physically move but the metadata will migrate to ECS components at ORNL.
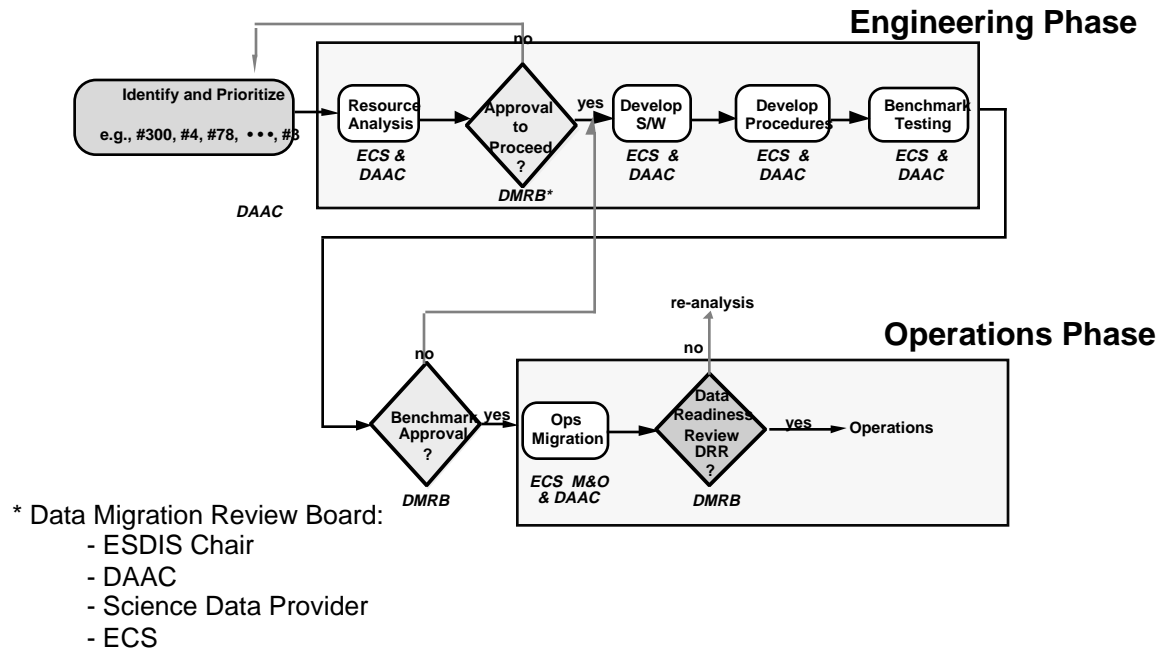
Engineering Phase

Operations Phase

* Data Migration Review Board:
  - ESDIS Chair
  - DAAC
  - Science Data Provider
  - ECS

Figure 13.5-1. The V0 Data Migration Process for Each V0 Data Product or Group of Similar Data Products

Before, during, and after the migration process, V0 data will be available to the science community. Before starting the migration process, V0 data will be available to users through direct access to V0. During the migration process, V0 data will be available either through direct access to V0 or through interoperability between ECS and V0. After operational responsibility transfers from V0 to ECS, data will be available through direct access to ECS or through interoperability between V0 and ECS.

The migration process is designed to allow ESDIS/DAACs to steer the migration process through their decisions, as depicted in Figure 13.5-2, with ECS providing the engineering, expertise, and recommendations needed for management and technical decision making.   For each V0 data product there are four key decision points: 1) prior to beginning analysis of the data product, 2) after analysis and before beginning software development, 3) after benchmark testing and before beginning operational migration, and 4) after operational migration and before declaring migrated data and metadata available in ECS to end users. Decisions are made by the Data Migration Review Board (chaired by ESDIS with DAAC, Science Data Provider and ECS representation) and the decisions executed by the ECS V0 data migration team. At each DAAC, the migration process is documented in a DAAC Data Migration Plan which is a working document that lives throughout the migration process at a DAAC. The V0 data products that are candidates for migration are identified in NASA's Science Data Plan (SDP): the most recent published SDP is dated July 1994, Version 3.

"4 Key ESDIS/DAAC Decision Points"

(1) **Identify and Prioritize Data Product for Analysis**

(2) Review Analysis of Data and Services
- Migration / Conversion Requirements
- Optional HDF-EOS Conversion
- Optional Metadata Enhancement
- Estimated Resources
Choose Migration Options

Engineering Phase

Identify and Prioritize
e.g., #300, #4, #78, •••, #3

DAAC

Resource Analysis
ECS & DAAC

Approval to Proceed — no / yes
DMRB*

Develop S/W
ECS & DAAC

Develop Procedures
ECS & DAAC

Benchmark Testing
ECS & DAAC

* Data Migration Review Board:
- ESDIS Chair
- DAAC
- Science Data Provider
- ECS

re-analysis

Operations Phase

Benchmark Approval ? — no / yes
DMRB

Ops Migration
ECS M&O & DAAC

Data Readiness Review DRR ? — no / yes
DMRB

Operations

(3) Review Test Results
- Sample Migrated Data Granules
- Sample Migrated Metadata
- ECS Ingest
- ECS Data Server Population
- Validation Approach
Approve Start of Operational Migration

(4) Review Completed Migration
- Estimate of Expended Resources
- Issues / Problems
- Validation Results
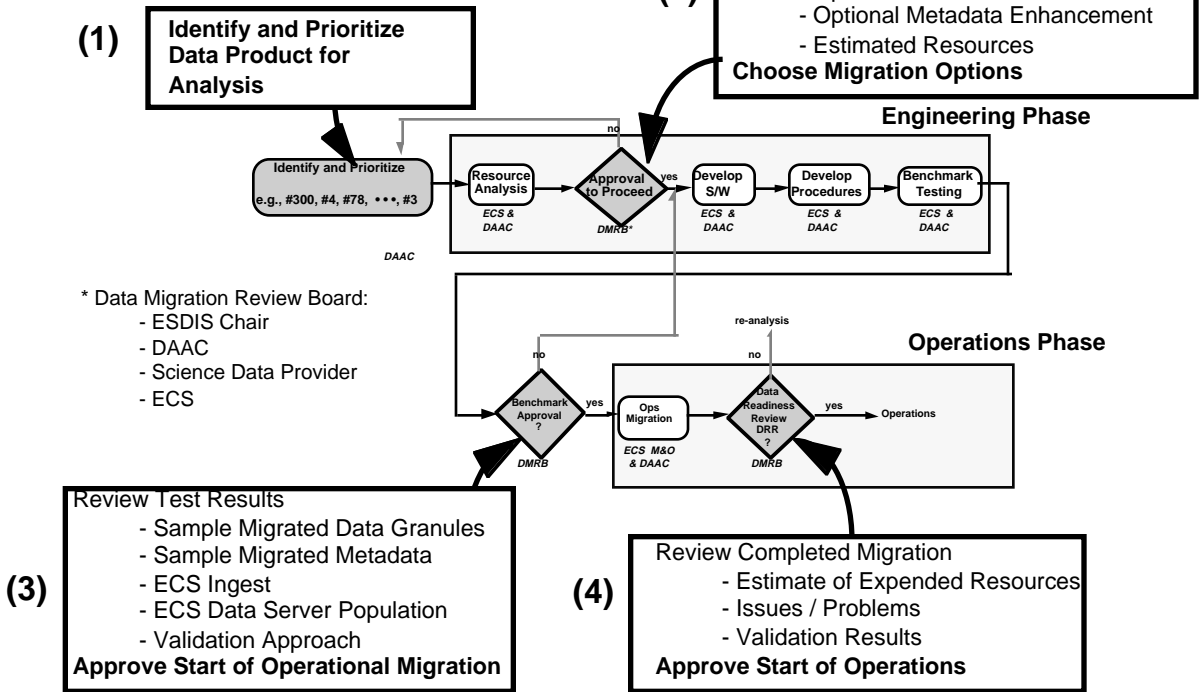**Approve Start of Operations**

Figure 13.5-2. ESDIS/DAACs Steer the Migration Process; ECS Provides the Engineering, Expertise, And Recommendations to Support Management and Technical Decision Making

13.5.1   Engineering Phase Schedules

The schedule for the Engineering Phase begins in September 1995 and continues through the end of DAAC benchmark testing at the end of 1997 as shown in Figure 13.5-3.
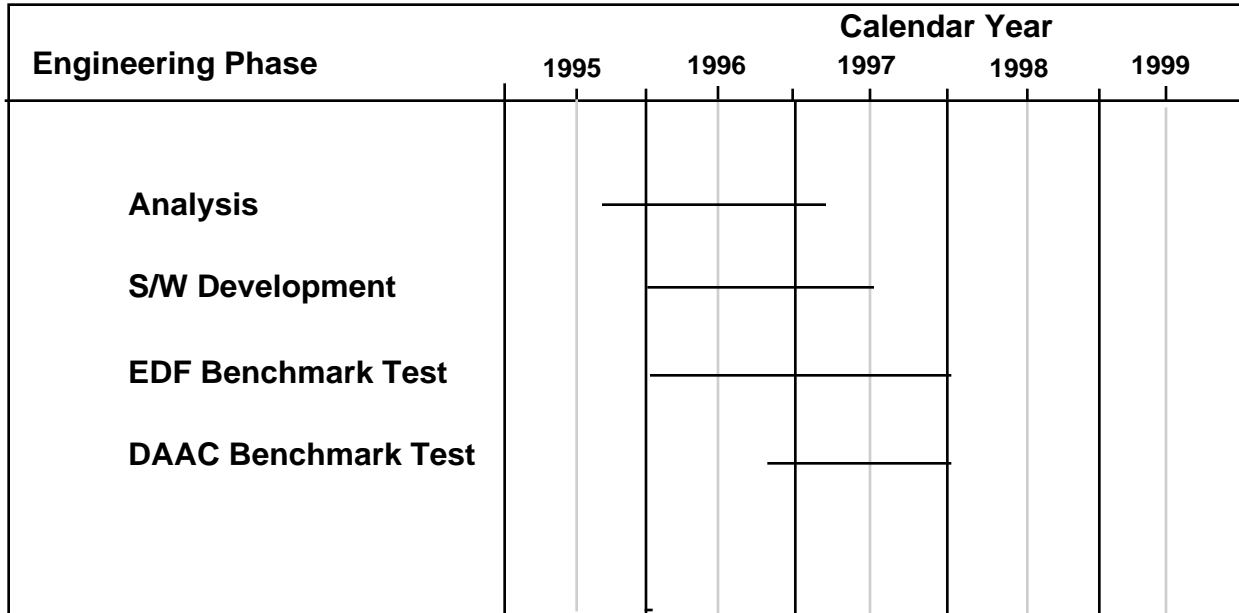
Engineering Phase	Calendar Year				
	1995	1996	1997	1998	1999
Analysis					
S/W Development					
EDF Benchmark Test					
DAAC Benchmark Test					

Figure 13.5-3. The Schedule for the Engineering Phase.

13.5.2   Operations Phase Schedules

The schedule for the Operations Phase begins in October 1996 at the Release A DAACs (GSFC, LaRC, and MSFC) and June 1997 for the Release B DAACs (ASF, EDC, JPL and NSIDC). The Operations Phase continues until late 1999 as shown in Figures 13.5-4 and -5. Specific DAAC schedules will be adjusted to account for the number and volume of products and any special requirements such as the need to migrate ASF products in a narrow window to support the rapid transition of SAR products to ECS.

Operations Phase (Release A DAACs)	Calendar Year				
	1995	1996	1997	1998	1999
Data Migration Facility Preprocessing					
Ops Metadata Population					
Ops Data Population					

Figure 13.5-4. The Schedule for the Operations Phase for the Release A DAACs

Operations Phase (Release B DAACs)	Calendar Year				
	1995	1996	1997	1998	1999
Data Migration Facility Preprocessing					
Ops Metadata Population					
Ops Data Population					

Figure 13.5-5. The Schedule for the Operations Phase for the Release B DAACs

13.5.3   Release A Data and Metadata Migration Schedules

The purpose of the Release A data and metadata migration is to preprocess V0 data, ingest the preprocessed data into ECS, and populate ECS Data Servers with the migrated data and metadata. Release A migration consists of two distinct activities: 1) early test of Release A components using migrated data and metadata and 2) subsequent operational population of ECS Data Servers with migrated V0 data and metadata.

Several small data products, e.g. G-26 (TOMS), L-1 (ERBE), and M-60 (TOVS), as well as partial products, e.g. G-1 (AVHRR Land Mosaic), L-50 (ISCCP Dx), will be migrated by 1 February 1996 in the ECS Development Facility to support initial ECS testing of the Ingest and Data Server Subsystems, as well as I&T (Figure 13.5-6). Additional samples of migration data will be made available on 1 May 1996 to augment the above testing as well as support System I&T and IATO/DAAC test (Figure 13.5-6). Early migration also allows early exercising and validation of the migration process.
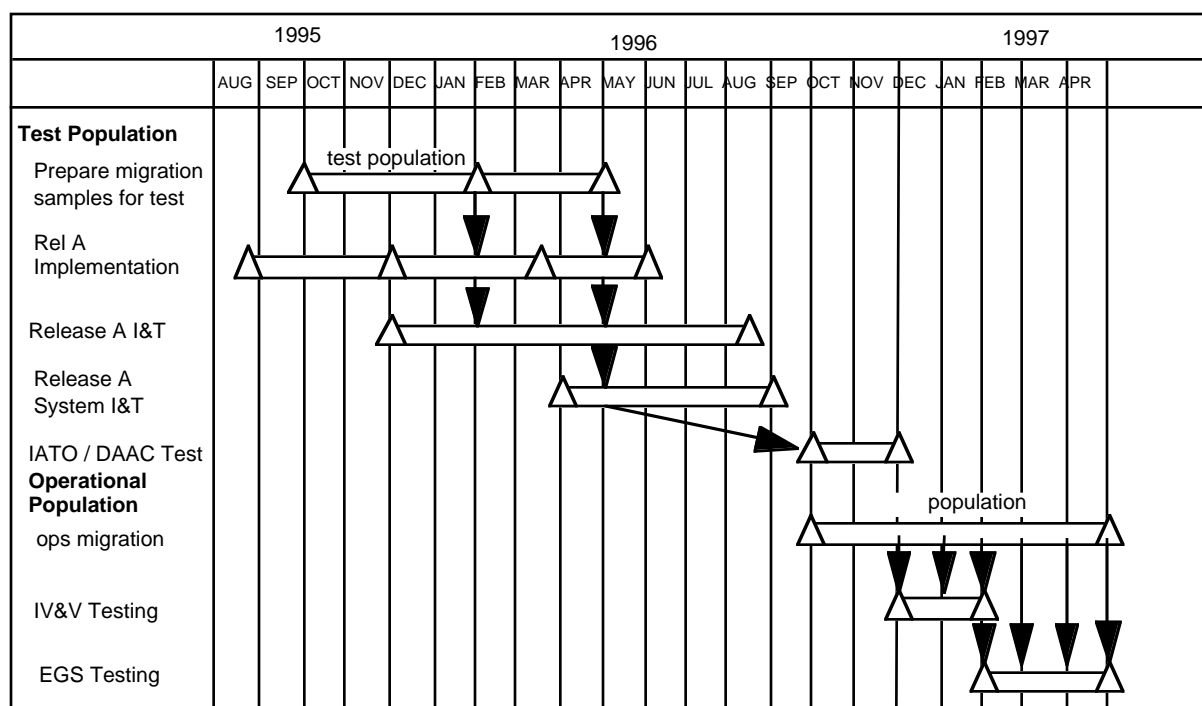

Figure 13.5-6. The Schedule for Release A Data and Metadata Population

Operational migration (i.e. preprocessing in V0 migration facility, ingest into ECS, and operational population of ECS Data Servers) begins with the initial migration of 34 V0 data products (2.9 TBytes, defined in technical baseline) into the three ECS Release A DAACs (GSFC, LaRC, and MSFC) prior to the start of Release A operations.   During Release A operations an additional 75 products (4 TBytes) will be migrated from V0 to the Release A DAACs. The earliest that operational population can begin at the Release A DAACs is 1 October 1996, before IATO/DAAC testing is completedby ECS.

Abbreviations and Acronyms

ADC	Affiliated Data Center
ADS	Archive Data Set
ALT	Altimeter
ASCII	American Standard Code for Information Exchange
ASF	Alaska SAR Facility
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer (formerly ITIR)
AVHRR	Advanced Very High Resolution Radiometer
BB	broad band
BOD	beneficial occupancy date
CCR	commitment, concurrency, and recovery protocol; configuration change request
CD	compact disk (optical disk)
CDR	critical design review
CDRL	Contract Data Requirements List
CERES	Clouds and Earth's Radiant Energy System
CIESIN	Consortium for International Earth Science Information Network
CLCW	command link control word
CM	configuration management; corrective maintenance
COTS	commercial off-the-shelf (hardware or software)
CSA	Canada Space Agency; Configuration Status Accounting
CSMS	Communications and Systems Management Segment (ECS)
CSR	Consent to Ship Review
DAAC	Distributed Active Archive Center
DADS	Data Archive and Distribution System (ECS)
DAO	Data Assimilation Office
DAR	data acquisition request
DBA	data base administrator
DBMS	data base management system
DCE	distributed computing environment

DID	data item description
DME	distributed management environment
DORRAN	Distributed Ordering, Reporting, Researching, and Accounting Network
DSN	Deep Space Network
EAP	EOSDIS Advisory Panel
Ecom	EOS Communications
ECS	EOSDIS Core System
EDC	EROS Data Center
EDF	ECS Development Facility
EDHS	ECS Data Handling System
EDOS	EOS Data and Operations System
EGS	EOS Ground System
E-mail	electronic mail
EOC	Earth Observation Center (Japan); EOS Operations Center (ECS)
EOS	Earth Observing System
EOS AERO	EOS Aerosol Project
EOS AM	EOS AM Project (morning spacecraft series)
EOS CHEM	EOS Chemistry Project
EOS COLOR	EOS Ocean Color Project
EOSDIS	EOS Data and Information System
EP	Evaluation Package
ESDIS	Earth Science Data and Information System
ESN	EOSDIS Science Network (ECS)
ETR	element test review
FDDI	fiber distributed data interface
FDF	Flight Dynamics Facility
FOS	Flight Operations Segment (ECS)
FSMS	File and Storage Management System
FSMS	file storage management system
GCDIS	Global Change Data and Information System
GFE	government furnished equipment

GOES	Geostationary Operational Environmental Satellite
GSFC	Goddard Space Flight Center
GUI	graphic user interface
H/K	housekeeping
H/W	hardware
HDF	hierarchical data format
HMI	human machine interface
I/O	input/output
I&T	integration and test
IATO	Independent Acceptance Test Organization
ICC	Instrument Control Center (ECS)
IDR	incremental design review
ILN	Intermediate Logic Network
IMS	Information Management System (ECS)
IP	international partner; internet protocol
IST	Instrument Support Terminal (ECS)
IV&V	independent verification and validation
JPL	Jet Propulsion Laboratory
LAN	local area network
Landsat	Land Remote-Sensing Satellite
LaRC	Langley Research Center
LIS	Lightning Imaging Sensor
L0-L4	Level Zero through Level 4
LSM	Local System Management (ECS)
LTIP	long-term instrument plan
LTSP	long-term science plan
M&O	maintenance and operations
MISR	Multi-angle Imaging Spectro-Radiometer
MITI	Ministry of International Trade and Industry (Japan)
MODIS	Moderate Resolution Imaging Spectrometer
MOPITT	Measurements of Pollution in the Troposphere

MSFC	Marshall Space Flight Center
MSU	mass storage unit, microwave sounding unit
NASA	National Aeronautics and Space Administration
Nascom	NASA Communications Network
NASDA	National Space Development Agency (Japan)
NCC	Network Control Center
NESDIS	National Environmental Satellite Data and Information Service
NOAA	National Oceanic and Atmospheric Administration
NSI	NASA Science Internet
NSIDC	National Snow and Ice Data Center
ODC	other data center
OOD	object oriented design
ORNL	Oak Ridge National Laboratory
OSF	Open Systems Foundation
P&S	planning and scheduling
Pacor	packet processor
PB	petabyte (10^{15})
PDR	preliminary design review
PDS	Planetary Data System; production data set; Platform Data System
PGS	Product Generation System (ECS)
PM	preventive maintenance; program/project manager
PR	precipitation radar (TRMM)
QA	quality assurance
Q/L	quick look
R/T	real time
RAID	redundant array of inexpensive disks
RFP	request for proposal
RID	review item discrepancy
RRDB	recommended requirements database
RRR	release readiness review
S/C	spacecraft

S/W	software
SA	single access
SAR	Synthetic Aperture Radar; system architecture review
SCF	Science Computing Facility
SDPS	Science Data Processing Segment
SDR	software design review; system design review
SeaWiFS	Sea-Viewing Wide Field-of-View Sensor
SIP	System Integration and Planning
SMC	System Management Center (ECS)
SN	Space Network
SOW	statement of work
SSM/I	Special Sensor for Microwave/Imaging (DMSP)
TB	terabyte (10^{12})
TBD	to be defined; to be determined
TBR	to be replaced/resolved/reviewed
TBS	to be supplied
Tbyte	terabyte
TCP/IP	Transmission Control Protocol/Internet Protocol
TGT	TDRSS Ground Terminal
TMI	TRMM Microwave Image
TOVS	TIROS Operational Vertical Sounder
TRMM	Tropical Rainfall Measuring Mission (joint US-Japan)
TRR	test readiness review
TSDIS	TRMM Science Data and Information System
VIRS	Visible Infrared Scanner (TRMM)
V0	Version 0
WAN	wide area network
WSC	White Sands Complex